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GLOBAL MARKET SURVEY

Export Opportunities for
MATERIALS HANDLING EQUIPMENT

U.S. DEPARTMENT OF COMMERCE/Domestic and International Business Administration

This Global Market Survey is one in a series of publications focusing on overseas marketing opportunities for U.S. suppliers in selected industries. These Surveys are prepared by the Office of International Marketing and are based on research conducted in key foreign markets.

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Export Opportunities for

MATERIALS HANDLING EQUIPMENT

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U.S. DEPARTMENT OF COMMERCE

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Global Marketing Strategy for the 1970's

A Cooperative Endeavor

- Both in concept and implementation, an effective U.S. export expansion program for the 1970's requires a joint undertaking by industry and government. Such a cooperative endeavor, aimed at worldwide market penetrations, involves a medium-to-long term effort between government and specific U.S. industries having the highest potential for sustained growth in exports.
- The Department of Commerce's Bureau of International Commerce (BIC) has the primary responsibility for the government to work with industry to formulate and implement global marketing actions.

Key Features of the Strategy

- Comprehensive Global Market Surveys to pinpoint the best foreign markets for selected U.S. product categories and identify qualified distributors, agents, and buyers in those priority markets.
- A nationwide campaign with Commerce Department district office account executives encourages U.S. manufacturers to participate in a cooperative export expansion program and assists them in establishing their own global marketing plan.
- Professional counseling for U.S. firms on export sales techniques and opportunities in target markets.
- A schedule of overseas trade promotion activities, on a year-round basis, to provide U.S. companies direct marketing access to a sales expansion in target markets abroad.

Product Selection

- Selection of product categories to receive "target" treatment is based upon analysis by the Department of export-expandable lines. Concurrent discussions with U.S. industry establish priorities and determine the interest of individual firms in undertaking an export program.
- Generally these product categories represent industries in which the United States has technological or other advantages over foreign competition.
- Global Market Surveys already published or scheduled for publication are:

  Electronic Data Processing Equipment (1970)
  Food Processing & Packaging Equipment (1971)
  Pumps, Valves, and Compressors (1972)
  Industrial & Scientific Instruments (1972)
  Air Conditioning & Refrigeration Equipment (1972)
  Agricultural Machinery & Equipment (1973)
  Micrographics Products (1973)
  Biomedical Equipment (1973)
  Computers & Related Equipment (1973)
  Material Handling Equipment & Systems (1974)
  Production & Test Equipment for the Electronics Industry (1974)

Tooling Up for World Market Research

The Office of International Marketing develops, with industry assistance, a marketing-oriented definition of the product category, determines the market research requirements, and identifies the country markets to be examined. The research is structured to verify the existence and viability of foreign markets for specific products. The parameters of the market research cover:

- Size of the country market.
- Market trends and developments in the use and application of equipment within the product category.
- Prospects for U.S. exports of the product category in general and the specific types of equipment that appear to have particularly promising sales potential for U.S. suppliers.
- Market data that will assist U.S. firms in conducting business in the country market.
- Identification of promotional activities: Major trade exhibitions, seminars, congresses, and trade missions scheduled for the next 2 years in this field.

Target Industry Research Strategy

- Market research in each target country is conducted in strict accordance with rigid specifications through contracting with U.S. or overseas firms or by utilizing Commerce or U.S. Foreign Service staffs.
- Heavy emphasis is placed upon individual interviews, deemed especially important in estimating market trends.
- The Global Market Survey is then prepared, based on the information obtained in the market research as well as from other sources. Each Survey is designed to provide U.S. industry executives with: An

overview of worldwide performance of the selected product category; summaries of each country researched under the program; and Commerce services and assistance to U.S. business to facilitate foreign market penetration.

The Export Promotion Abroad

- The best trade promotion events related to the product category for each country are listed in each Global Market Survey in the "Schedule of Events" section.

Identification of American Firms

- All identifiable U.S. manufacturers, distributors, exporters, and industry organizations concerned with the selected product category are listed in a Commerce master file.
- All firms identified are encouraged to participate in the global marketing strategy calculated to expend their export sales.

The Action Program

- International Trade Specialists of the 43 Department of Commerce district offices meet with officials of prospective participants to discuss marketing strategy.
- The ultimate aim is to assist each firm in the development of an individual global marketing plan tailored to the specific needs and export capabilities of that particular company. The plan is a business/government cooperative effort to increase exports or launch new export operations.
- A representative of the appropriate Department of Commerce district office will work with each participating firm as its "account executive" throughout the campaign.
- All U.S. firms engaged in the manufacture or sale of products in the target industry are encouraged to participate in the action program.

Further Details

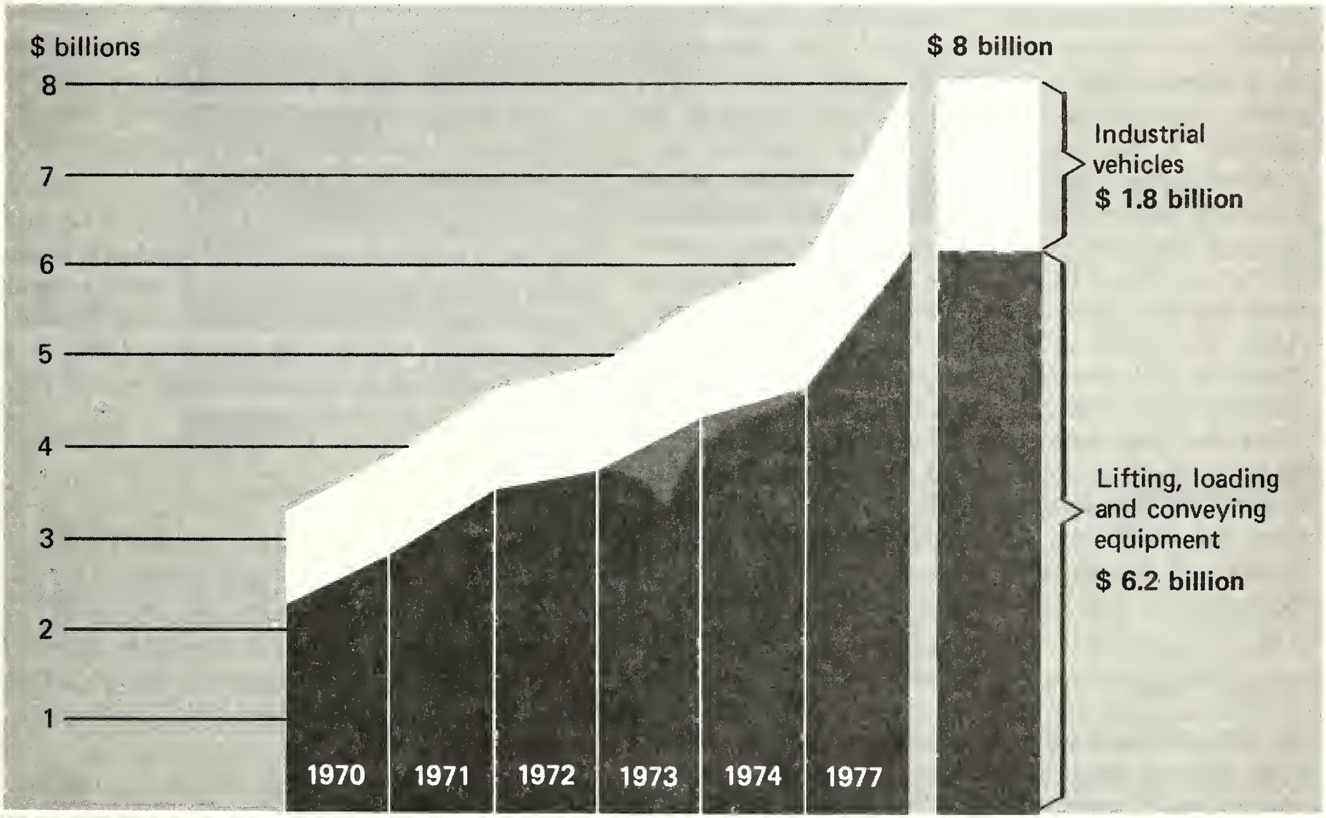
- Additional information may be obtained from the Domestic Field Program Division, Office of Export Development, Bureau of International Commerce (264), U.S. Department of Commerce, Washington, D.C. 20230, or from any of the Department's 43 district offices.
- Copies of the Global Market Survey are available from the Department's district offices or from the National Technical Information Service, Springfield, Virginia 22151. Prices vary.

Sixteen Growing Markets—An Overview

The total market for materials handling equipment in the 16 countries in which marketing research is summarized in this Global Market Survey was valued at $4.9 billion in 1972. This included $3.8 billion in lifting, loading, and conveying machinery and $1.1 billion in industrial vehicles. The countries surveyed represent approximately 85% of the total value of the global market, exclusive of the United States and Canada. The size of these markets by 1977 is expected to exceed $8 billion, an increase of 65% over 1972 in both product categories. The marketing potential in seven other countries is provided in a separate section of this Survey.

During the period 1970-73, the growth rates of the apparent consumption of materials handling equipment in the 16 countries surveyed reached a peak of 19% in 1971 and a low of 6.5% in 1972. Lifting, loading and conveying equipment sales rose 24% in 1971 and 6.7% in 1972, while industrial vehicles gained 5.6% in 1971 and 5.8% the following year. These fluctuations reflected the acceleration and ebbing of capital expenditures in Europe and Japan during the previous 12 to 18 months. The outlook for 1973, (as of the first half, during which the market research was conducted) was for a strong recovery. The markets for both lifting, loading, and conveying

COMPOSITE OF SURVEYED MARKETS– SIZE AND TRENDS



MARKET SIZE ($ millions)

Lifting, loading & conveying equip.	2,836	3,519	3,755	4,316	4,630	6,174	
Industrial vehicles	1,014	1,072	1,135	1,302	1,427	1,855	
Total, Materials Handling Equipment	3,850	4,591	4,890	5,618	6,057	8,029	1970-77
Annual growth rate		19.2%	6.5%	14.9%	7.8%	9.8%	11.1%

equipment and industrial vehicles were expected to achieve growth rates of 15% for the year.

Prospects for 1974 and 1975 continue favorable. Industrial vehicles sales are expected to accelerate sufficiently to achieve a cumulative growth of 63.4% for the 8-year period ending in 1977, just one percentage point less than that for lifting, loading, and conveying equipment.

Rising labor costs and wage/price spirals are driving industries in inflation-stricken economies toward modernization and automation. The emphasis for the present and near future is on higher productivity and on expansion through increasing capital investment. In areas where production processes are already automated, firms are turning toward expansion and modernization of storage and distribution systems to reduce cost burdens. Demand for advanced equipment and systems to facilitate materials handling is growing twice as rapidly as other forms of capital investment in many markets. In developing countries, industrialization is the chief stimulant of demand for materials handling equipment and systems.

The average annual growth of 10% projected for materials handling equipment through 1977 should create sufficient buoyancy to justify aggressive sales and marketing programs. The value forecasts and corresponding growth rates for the individual countries shown in the chart on the next page are conservative, however, compared to recent experience. They reflect restraint among European businessmen in making forecasts, particularly for 1976 and 1977. With business activity strong in both Europe and Japan, end-users are experiencing soaring demand for their products and have stepped up their purchases of capital goods, including materials handling equipment and systems. Rising production costs are also stimulating the demand for materials handling equipment which can help reduce costs. Interestingly, increases in the costs of capital goods and of borrowed capital appear to have had little dampening effect on procurement decisions because buyers often anticipate further cost increases and because a significant portion of such cost increments are recoverable as tax deductions.

Market Trends

Of the 16 countries portrayed in the chart on the next page, those in which total markets for materials handling equipment are expected to realize growth of 100% or more by 1977 are: Argentina, Poland, Spain, the United Kingdom, and the Union of Soviet Socialist Republics. Five countries among the 16 surveyed purchased more than $20 million in U.S. equipment during 1972, and two of these—France and Germany—were among those having a total market value of $500 million or more. U.S. exports in 1972 to these five major customers were: France, $35.6 million; United Kingdom, $33.9 million; Belgium, $33.5 million; Brazil, $28.3 million; and Germany, $23.1 million. Though the smaller markets might appear to be less attractive because of size, they should be taken into account in the international sales plans of American suppliers because of the worthwhile sales and profits opportunities in these countries.

The outlook for U.S. exports of materials handling equipment to all countries in 1973 reflects the strong demand for U.S. equipment in world markets. Shipments through July were valued at $164 million,[1] or 21% ahead of the same period in 1972. This compares with an average annual growth rate of 13% over the last five years. Projected at the rate of 21% for the year, 1973 exports would reach $320 million. U.S. exports by region for 1972-73 are indicated on the global map.

U.S. exports of materials handling equipment and systems should continue to show vigorous growth through 1977 in the 16-country group. Because of the advanced state of the art in the U.S. market and the size of the U.S. materials handling equipment industry, U.S. manufacturers have formidable capabilities in many equipment lines which have the respect of both competitors and buyers in overseas markets. Market research recently conducted by the U.S. Department of Commerce reveals that demand for American equipment will remain strong because of its superior quality and durability, larger capacity, greater flexibility and handling ease, as well as technological sophistication, in comparison with most foreign products.

The data on the individual countries in the accompanying chart reflects a continuing dependency of most countries on imported equipment, even though manufacturers abroad may be expected to expand their production. U.S. manufacturers will find strong demand for the more advanced types of equipment and systems as well as their extensive applications know-how.

West Europe

West Europe is the largest market for U.S. materials handling equipment. The area accounted for 42% ($75 million) of U.S. exports (less Canada) in 1972.

Direct exports represent perhaps only 50% of the overall penetration of U.S. industry in Europe. Local production of the European affiliates of U.S. companies accounts for the rest.

Manufacturing in Europe through a subsidiary or licensee has had certain advantages for U.S. materials handling firms. However, there have been marked changes recently in the comparative economics of international business. Some shifting of production back to the United States has been reported and is expected to continue for the following reasons:

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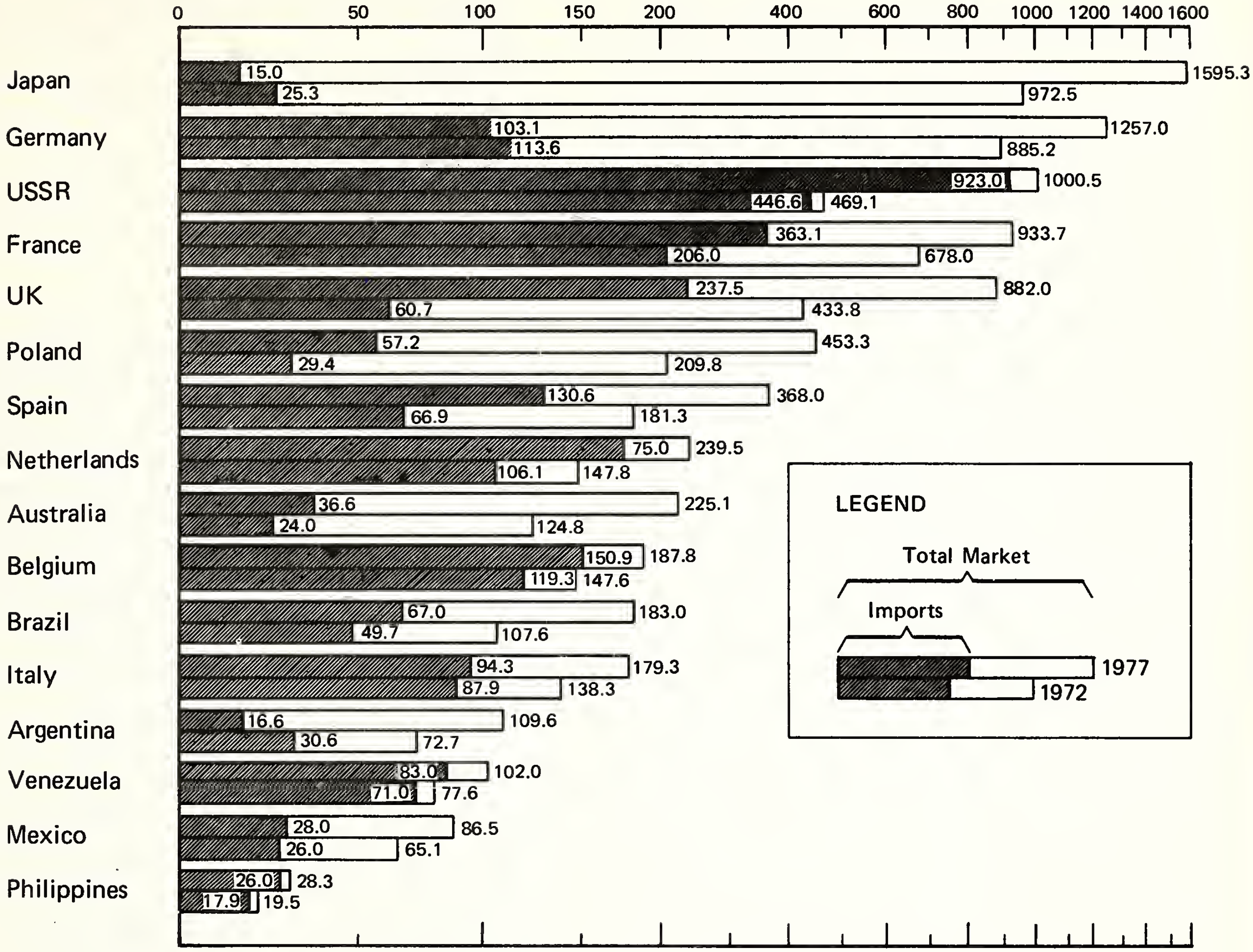
[1] For comparability with historical data, these statistics and those on the regional discussion that follows and in the accompanying map do not include mobile cranes and wheel-type integral tractor-shovel loaders (Sch. B. Nos. 719.3104, 719.3108 through 719.3120, and 719.3142). See *The Product Category* contained in the accompanying box.

THE IMPORT AND TOTAL MARKETS IN SURVEYED COUNTRIES, 1972 and PROJECTED 1977
(in $ million)



- The major realignment of world currencies has improved the price competitiveness of U.S.-origin goods in foreign markets.
- Inflation and labor shortages are pushing foreign costs up faster than costs in the United States. In 1972, unit labor costs rose 11.4% in the six original member countries of the European Economic Community, 6.3% in the United Kingdom, and 20% in Japan, as compared with 2% in the United States.
- Growing export sales can serve as a hedge against cyclical declines in domestic sales, permitting American firms to continue to operate at higher rates of production, thus improving comparative costs still further.

These factors indicate the increasing likelihood of more effective U.S. competition in the European market for materials handling equipment.

Latin America

This region absorbed 29% ($51.5 million) of U.S. exports (excluding Canada) of materials handling equipment in 1972. The four Latin American countries contained in the Survey are the major buyers of U.S. materials handling equipment. In addition, the U.S. market share in these countries is much higher than in Europe. Many Latin American buyers have had long standing relationships with U.S. manufacturers. In addition to the frequent preference for U.S. equipment, parts availability and rapid delivery made possible by U.S. geographic proximity to Latin America are important factors in making sales in this area. Furthermore, many U.S. companies are represented in the industrial sectors which consume materials handling equipment. In the research on Venezuela, for example, it was found that this represents an excellent opportunity for new export sales, as many of the purchasing decisions and actual orders are made in the U.S. headquarters of the company. Materials handling equipment manufacturers should therefore continue to find good markets in Latin America.

Licensing arrangements and joint ventures have proven advantageous in some countries, due to growing nationalism in the region. However, local producers as a whole are only able to supply the more traditional types of equipment. The more advanced and specialized equipment and systems will continue to be imported.

The U.S.S.R. and Eastern Europe

The diminution of tensions between the Socialist countries and the United States has greatly improved prospects for increased trade with these markets. Many political, financial, and commercial obstacles which had previously impeded trade are being removed. A case in point is the trade agreement signed with the Soviet Union last year. Most-favored-nation (MFN) treatment is already effective in relation to trade with Poland. Further, the granting of long-term credits will reduce financial barriers to increased sales opportunities. The Export-Import Bank of the United States, for example, has begun to provide credits to finance major projects.

The overwhelming bulk of trade in the Socialist countries flows between the U.S.S.R. and COMECON countries of Bulgaria, Hungary, East Germany, and Czechoslovakia. Among western supplier countries, however, the United States has an excellent position, which is improving rapidly. In lifting, loading, and conveying equipment, for example, imports from these suppliers to the U.S.S.R. rose 15% in 1972 and were expected to rise some 24% in 1973. The U.S. share of the total U.S.S.R. market for these products in 1971 was almost 7%, but this represented one-third of the imports from all Western suppliers.

Dealing in a centrally planned economy is a new experience for most U.S. manufacturers. Contact with end-users, for example, often requires prior authorization by appropriate authorities in contrast to the customary direct approach used in business dealings in western nations. Business negotiations for sales to the Soviet Union are effected with either a prime contractor for a large project or with the foreign trade organization responsible for the imports and exports of either the equipment being purchased or the user industry. More U.S. marketers have developed knowledge of industry organization, government policies and procedures and effective methods to make their products known in Socialist countries, and their sales are increasing.

Highlights of Best Sales Opportunities

The market research studies conducted for the Office of International Marketing identified specific equipment that presents good-to-excellent U.S. sales opportunities in the 16 markets. The following categories were screened for products of best sales potential:

Lifting, Loading, and Conveying Equipment
- Conveyors
- Cranes
- Derricks
- Elevators
- Hoists
- Monorails
- Vacuum lifting equipment

Industrial Vehicles
- Powered trucks
- Industrial tractors
- Floor trucks

Systems and Specialized Equipment

Specific products having favorable sales potential are listed for each country in the individual country surveys.

Potential buyers of materials handling equipment have become increasingly interested in the reduction of costs made possible by application of automated materials handling equipment. In many industries, handling constitutes anywhere from 15 to 80% of total costs, so reduction of these costs can substantially improve profits. Particularly in Europe, rising labor costs induced by shortages are motivating firms to change from manual to mechanized and automated handling and conveying. In an article appearing in *The Financial Times* of London, on January 4, 1973, David Walker pointed out:

> "For years warehousing has been regarded as a mere adjunct, and not a very important one at that, to the crucial operations of manufacturing and then selling goods. Its true significance as a major eater of expenses has all too seldom been recognized. And the vital role of distribution, of which storage and warehousing is obviously an essential part as the crucial link between the production process and the final customer, has been consistently undervalued."

Italy is, and will remain for some years to come, a good market for materials handling. Roughly 63% of sales of lifting, loading, and conveying equipment in 1970, for example, were imported; in 1971, approximately 66%; and in 1972, more than 68%. It is well behind its more industrialized neighbors in mechanization and automation of the handling of materials, and is striving to catch up with its European competitors. With the demand strong and Italian firms unable to supply all the types of equipment required, foreign manufacturers have found an open door for their equipment, especially in certain sectors.

The U.S.S.R. is one of the fastest growing markets of materials handling equipment and systems in the world. It offers exceptional opportunities to U.S. exporters of these products. Sales of lifting, loading, and conveying equipment jumped threefold in 1971 over previous years, reaching more than $18 million. Sales of U.S. suppliers of materials handling equipment to the Soviets should reach no less than $45-50 million by 1977. A containerization program launched in 1971 calls for a total investment from 1971-75 in the amount of $30 billion. In the wake of the detente between the two nations, demand for U.S. equipment in particular, generated by the Soviet modernization program, is expected to climb rapidly.

In Latin America and other developing regions, the availability of low-cost labor has thus far held back recognition of the cost benefits to be derived from automation of handling. Many American firms have reported making large sales, however, by stressing the increased productivity gained through the use of U.S. equipment. Profits have been increased by better equipping personnel with labor-saving materials handling equipment.

One of the best opportunities for sales exists in Brazil, where rehabilitation of the Recife port area is being considered. This includes reconstruction of transit sheds, warehouses, ancillary buildings, railway tracks, roads, grain unloading equipment and other cargo handling equipment. An appraisal report calling for expenditures of $30.3 million was being prepared in August 1973 for the International Bank for Reconstruction and Development. Government studies are also underway for the construction of a new port near Rio Grande in Southern Brazil. Brazil presents an especially attractive market because its economy is currently growing at 10% annually. The materials handling sector has grown in excess of 20% annually. Domestic sources cannot meet the requirements of major projects such as these, due to limitations in scope and capacity of production, so foreign manufacturers will be encouraged to bid on many sizable orders.

Perhaps the most spectacular sales gains can be made on a long-range basis in materials handling systems and specialized equipment. The immediate need for stimulating sales is customer education. The average customer has relatively little knowledge of the most modern and sophisticated types of materials handling equipment and systems. As he becomes aware of how this U.S. technological know-how can benefit him, sales will grow.

Special Factors—Devaluation and Inflation

Economic and monetary policies in 1972-73 were synonymous with both the major realignment of world currencies resulting in the devaluation of the U.S. dollar, and, more recently, the increasing seriousness of persistent inflation, particularly in the industrialized countries. Both are positive forces in aiding U.S. sales of materals handling equipment and systems abroad.

Suggested Action

Superior U.S. technology ranks high among the reasons cited by foreign buyers for their preference for U.S. equipment. These buyers say this could be exploited more fully by U.S. suppliers through:

- Increased availability in foreign markets of information on latest U.S. technology.
- Liberalization of financial terms, such as interest rates, grace periods, and repayment terms.
- More rapid delivery times for equipment, and especially spare parts.
- Improved technical consultation, both prior to sales and accompanying the installation of U.S. equipment.
- Improved after-sales service arrangements.

Often a "package deal" which includes installation, consultation, special financial arrangements, sale of equipment and after-sales servicing enables the supplier to make a major sale. Such packages are often required in projects let by international bidding. Though competition is often stiff, the winning bidder has a decisive advantage in the sale of replacement and additional equipment for years to follow.

U.S. manufacturers seeking to increase their foreign sales may wish to:

- Review their sales objectives in each market vis-a-vis the total market size as revealed in this Survey.
- Review their sales representation in these markets as to capacity to achieve sales objectives.
- Appraise sales support services and marketing strategy in each market to make sure they provide the most effective combination in keeping with company objectives and resources.
- Discuss their export activities and marketing needs with the commercial representative at the District Office of the U.S. Department of Commerce serving the area, generally the nearest one.
- Prepare an "action plan" geared to achieve company goals for market participation. One aspect of this plan should include participation in the most appropriate promotional events in the Schedule of Events appearing in this Survey.
- Request the required Commerce services described in the Export Information Section.

The Product Category

Three categories of materials handling equipment are considered within the purview of this survey. Lifting, loading, and conveying equipment includes conveyors, cranes, derricks, elevators, hoists, monorails and vacuum lifting equipment. Industrial vehicles used only for short distance transportation, handling or storing of loads include powered trucks (such as forklifts), industrial tractors and floor trucks. Finally, systems and specialized equipment encompasses systems relating to such areas as containerization, coding and decoding, vibrating feed and palletizing, among other types.

Complex equipment holds particularly good sales potential for U.S. suppliers, and special examination has been devoted to the study of its market potential. The product category relates principally to use in manufacturing, wholesale/retail trades, and transportation and public utilities.

Materials handling equipment is classified under the two international statistical classification systems, BTN (Brussels Tariff Nomenclature) and SITC (Standard Industrial Trade Classification) under the following codes:

	BTN	*SITC*
Lifting, loading and conveying machinery and accessories	84.22	719.31
Industrial vehicles and accessories	87.07	719.32

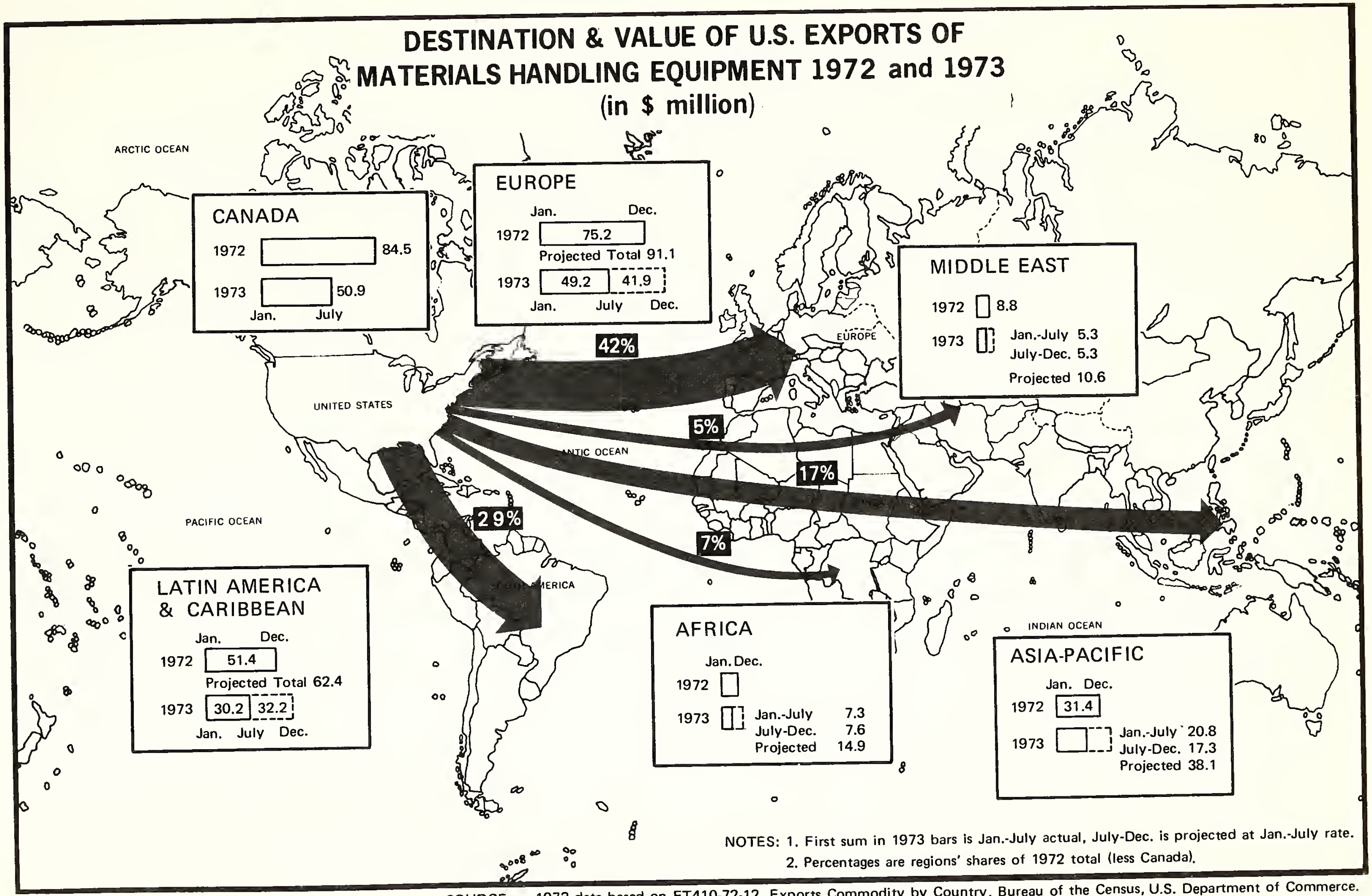
Most countries have their own statistical systems which are based on either BTN or SITC but which deviate from the international systems to varying extents. The two countries covered in this Survey which do not are Poland and the U.S.S.R. They have their own systems. Data in table 1 of the Country Market Surveys which follow are generally compiled from the national statistical reports of the respective subject countries. Every reasonable effort has been made to exclude products which are covered by the above broad international codes but which are not materials handling equipment. Where possible, a footnote or separate figures indicate values for parts. More detailed statistics are generally contained in the market research reports referenced at the end of each country survey. Certain equipment incorporated in materials handling systems, such as controls, instruments, and computers, is not readily identifiable as materials handling system components and therefore is not included in the statistics in this Global Market Survey. However, trade sources estimate that these components represent from 5 to 10% of the total value for materials handling equipment.

Table 2, "Exports by Principal Suppliers," in each Country Market Survey is derived from data published by the Organization for Economic Cooperation and Development (OECD). Because of the manner in which trade statistics are reported in many countries, these figures include track-laying equipment, mobile and heavy duty construction cranes, crawler tractor shovel loaders and other similar items generally considered to be mechanical rather than materials handling equipment. This equipment is used primarily in the construction, mining, and petroleum industries.

A table is provided at the end of each country survey showing U.S. exports of materials and mechanical handling equipment by Schedule B classifications. Nonetheless, even the detailed Schedule B does not distinguish between wheel tractor shovel loaders designed for handling materials in factories, mills and warehouses as opposed to those designed for construction, etc.

Similarly, the market research frequently discussed equipment types normally considered mechanical handling equipment such as mobile cranes. Such discussion was retained in the country surveys which follow for the benefit of manufacturers making these types of equipment.

DESTINATION & VALUE OF U.S. EXPORTS OF MATERIALS HANDLING EQUIPMENT 1972 and 1973
(in $ million)



NOTES: 1. First sum in 1973 bars is Jan.-July actual, July-Dec. is projected at Jan.-July rate.
2. Percentages are regions' shares of 1972 total (less Canada).

SOURCE: 1972 data based on FT410-72-12, Exports Commodity by Country, Bureau of the Census, U.S. Department of Commerce. Seven months 1973 figures compiled from Bureau of the Census preliminary data.

Country Market Surveys

Surveys on 16 primary markets for materials handling equipment and systems are contained in this section. These surveys are based on comprehensive on-site market studies conducted for the U.S. Department of Commerce in the respective countries.

These "Country Market Surveys" emphasize three product areas in the market for materials handling equipment systems, as follows:

- Lifting, loading and conveying equipment
- Industrial vehicles
- Systems and specialized equipment

Each "Country Market Survey" is organized in the following sequence:

Market Size

- Narrative and statistical presentation of market size for materials handling equipment, historical and projected growth, imports, and U.S. share of market.

Specific Sales Opportunities

- Listing and brief discussion of items within the above-mentioned product areas that are expected to hold attractive growth potential for U.S. manufacturers.

End-User Analysis

- Discussion of the most active market sectors, including potential growth areas of each.
- Profiles of typical users of materials handling equipment systems in each of the selected market sectors.

Competitive Environment

- Position of domestic materials handling equipment industry
- Foreign competition in market
- U.S. position
- Inhibiting factors (duties, trade regulations, etc.)

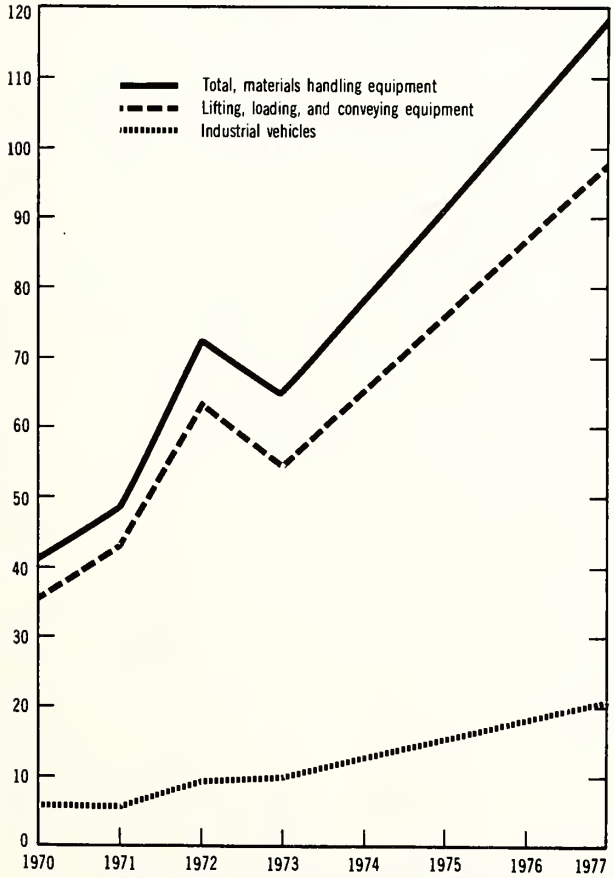
Technical Requirements

- Electrical power, voltage and frequency
- Technical standards and requirements where applicable.

Argentina

Increased Government funds for modernizing public enterprises and services and significant private industry investment are generating rapid growth in the Argentine market for materials handling equipment and systems (MHE&S). Sales are expected to grow at an average annual rate of over 16% during the 1974-77 period, exceeding $118 million in the latter year.

Argentina: Materials handling equipment market, 1970-72, and projected 1973-77
(in millions of U.S. dollars)



Source: Market research by Office of International Marketing, U.S. Department of Commerce, official Argentine statistics, and trade estimates.

The 1973 Argentine MHE&S market is estimated to total $64.5 million, up 56% over the 1970 market of $41.3 million (see table 1).[1]

Sales of lifting, loading, and conveying equipment should account for almost 85%, of Argentina's total 1973 materials handling equipment purchases. The market for such equipment is expected to reach $98 million by 1977, rising from an estimated $54.5 million in 1973. Sales of industrial vehicles are expected to grow from an estimated level of $10 million in 1973 to amost $21 million in 1977—an average rate of nearly 20% annually.

Imports of materials handling equipment were estimated at $15.7 million in 1973, representing 25% of the market. Growing at a predicted average annual rate of over 8% during the 1974-77 period, Argentina's import market is expected to total more than $21 million in the latter year.

Lifting, loading, and conveying equipment accounts for most of Argentina's materials handling equipment imports. Imports of this equipment were estimated at $13.5 million in 1973 and are expected to total nearly $18 million in 1977, reflecting an average annual growth rate of 7.5%. Imports of industrial vehicles are expected to grow at an average annual rate of 9%, increasing from an estimated $2.2 million in 1973 to over $3 million in 1977.

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[1] A dramatic increase in MHE&S sales was registered in Argentina in 1972 as industrial firms, anticipating a devaluation of the Argentine peso and the imposition of import controls, began stockpiling equipment and related parts and accessories. A jump in domestic MHE&S production from $30.7 million in 1971 to an estimated $42.5 million in 1972 and a rise in MHE&S imports from $18.5 million in 1971 to an estimated $30.6 million in 1972 contributed to a 1972 overall MHE&S market valued at $72.7 million. Because 1972 was not a typical year, estimated sales figures for 1973 have been used as a base in projecting the future Argentine MHE&S market.

The United States is Argentina's chief foreign supplier of mechanical handling equipment (see table 2). U.S. exports of mechanical handling equipment totaled $8.2 million in 1969 and represented 36.9% of the mechanical handling equipment import market. The value of U.S.-supplied equipment rose to $8.6 million in 1971, representing a 43.4% share of the market.

Germany was the second major foreign supplier in 1971, with sales of $3.2 million (a 16.2% share of the Argentine mechanical handling equipment import market). Spanish exports in 1971 were valued at $2.9 million, representing a 14.6% share of the import market.

While Germany and Spain increased their market shares over the 1969-71 period, the United Kingdom's and Italy's shares of the Argentine import market declined during that period. The United Kingdom in 1971 supplied mechanical handling equipment valued at $1.8 million (a 9.1% share) and Italy, with sales of $1.5 million, accounted for 7.6% of the market.

Statistics taken from *Exports, Commodity by Country*, FT-410, an annual publication of the U.S. Census Bureau, show in detail U.S. exports to Argentina of materials handling equipment in selected years (see table 3).

Specific Sales Opportunities

A market research study recently conducted in Argentina for the U.S. Department of Commerce reveals favorable sales opportunities for American manufacturers of the following products:

Lifting, Loading, and Conveying Equipment

- Container cranes
- Derrick cranes
- Bridge cranes
- Pedestal cranes
- Self-propelled cranes with telescopic booms
- Rack stackers
- Aerial monorails
- Aerial chain-pump receptors
- Chain pumps
- Stainless steel conveyors
- Chain conveyors
- Chains, ball bearings, and other parts and accessories

Industrial Vehicles

- High-capacity lift trucks
- Parts and attachments

Systems and Specialized Equipment

- Automatic conveyor systems
- Automatic storage and retrieval systems
- Computer-controlled order-picking equipment
- Electric platform scales
- Elevator load-control equipment

Lifting, loading, and conveying equipment.—Argentine purchases of lifting, loading, and conveying equipment are expected to total over $350 million during the 1973-77 period. Because of the high tariff protection accorded Argentine MHE&S manufacturers, the market for most traditional and low- to medium-capacity equipment is supplied by domestic production. U.S. suppliers will find their best sales opportunities in the market for heavy duty and technologically advanced equipment which is not produced domestically.

U.S.-manufactured cranes with capacities in excess of 5 tons have been in high demand in Argentina, with sales of such equipment jumping from $1.3 million in 1971 to $3.8 million in 1972. An intensive effort by Ferrocarriles Argentinos (Argentine Railroads) to introduce an integrated computer-based transport system should result in an expansion of the market for container cranes.

The market for electrical and mechanical component parts of bridge cranes should provide good sales opportunities for U.S. suppliers over the next

Table 1.—Argentina: Size of market for materials handling equipment, 1970-72, and projected 1973

(in millions of U.S. dollars)

	1970	1971	1972[1]	1973[1]
Lifting, loading, and conveying equipment				
Production	24.3	27.0	35.0	41.3
Imports	11.5	16.5	28.6	13.5
Exports	.3	.4	.3	.3
Market size[2]	35.5	43.1	63.3	54.5
Industrial vehicles				
Production	3.8	3.7	7.5	7.9
Imports	2.0	2.0	2.0	2.2
Exports	—	—	.1	.1
Market size	5.8	5.7	9.4	10.0
Totals, materials handling equipment				
Production	28.1	30.7	42.5	49.2
Imports	13.5	18.5	30.6	15.7
Exports	.3	.4	.4	.4
Market size	41.3	48.8	72.7	64.5

[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values based on data from foreign trade source estimates. Foreign trade values based on data from the *Foreign Trade Yearbook* of Argentina published by the National Bureau of Statistics 1970/71.

Table 2.—Exports of mechanical handling equipment to Argentina by principal suppliers, 1969-71 [1]
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	8.2	36.9	11.4	56.7	8.6	43.4
Germany	1.6	7.2	2.5	12.4	3.2	16.2
Spain	0.9	4.1	1.1	5.5	2.9	14.6
United Kingdom	7.6	34.2	1.4	7.0	1.8	9.1
Italy	2.2	9.9	1.8	9.0	1.5	7.6
Others	1.7	7.7	1.9	9.4	1.8	9.1
Total	22.2	100.0	20.1	100.0	19.8	100.0

[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual country surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by the Organization for Economic Cooperation and Development (OECD), based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

few years. Three bridge cranes purchased during the 1970-73 period were valued at $10 million each; sales are expected to total $40 million during the next four years.

Argentina requires aerial monorails and stainless steel conveyors, which are not produced domestically. Conveyors and monorails specially designed for sanitized operations in the food processing industry are of particular interest

Argentine manufacturers import large quantities of parts and components for integration into locally produced lifting, loading, and conveying equipment. Imports of parts and accessories, valued at $3.1 million in 1971, are expected to climb to $7 million in 1977.

Industrial vehicles.—U.S.-made equipment represented 65% of Argentina's imports of industrial vehicles in 1972. About 90% of the U.S. sales in this product subcategory in that year consisted of parts and accessories. The Argentine market for U.S.-made components for industrial vehicles should continue to be strong over the next several years.

U.S. exporters of heavy-duty, high-capacity forklift trucks, which are not produced in Argentina and therefore are not subject to high duties, should find a good market for their products. Demand for forklift trucks with capacities of 5 tons or more is expected to grow. As an example, investments by the Argentine Railroads in equipment to handle containers should include substantial purchases of high-capacity forklift trucks.

Systems and specialized equipment.—The trend toward automation of production and storage processes among Argentina's major purchasers of materials handling equipment should create significant sales opportunities for U.S. manufacturers. Because sophisticated systems and many types of specialized equipment are not now being produced in Argentina, imports will be required to satisfy demand

U.S. suppliers of integrated systems based on automatic conveyors should find a promising market in the Argentine grain industry, which has announced plans to include such systems in future expansion programs. Firms that are not yet ready to invest in complete systems are expected to purchase advanced specialized equipment such as electric platform scales and elevator load-control devices.

End-User Analysis

Improvements in Argentina's balance of payments and its increasing business stability are strengthening the country's economy. The real gross national product grew at an average annual rate of 4% over the period 1970-72 period and was expected to continue expanding at this rate through 1973. Industrial production grew by 8.3% in 1972. Investment in plant and equipment was recorded at $4.2 billion in 1971.

These favorable economic conditions, together with rapidly rising wages in Argentina, are contributing to the projected increase in the country's investment in materials handling equipment and systems. A considerable portion of Argentina's total 1973-77 expenditures for materials handling equipment and systems, which are projected at over $425 million, should be concentrated in four sectors of the economy.

Government investment should spur purchases of MHE&S by the country's rail transportation and steel sectors, while a combination of public and private investment in meat packing and grain storage should result in increased demand for materials handling equipment and systems in these sectors.

Rail transportation.—Ferrocarriles Argentinos, a Government enterprise that owns the Argentine rail transportation system, contributed about 1% to the country's gross national product in 1972. This firm's six rail lines employ about 142,000 persons. The railroads reported about 7.6 billion passenger/miles and 8.5 billion ton/miles over 25,800 miles of track in 1971. The Argentine Railroads, the largest consumer of MHE&S in Argentina, uses 40-ton bridge cranes and other equipment manufactured in Germany for removing railway trucks from locomotives.

The company's 270 forklift trucks and all its various types of conveyors are manufactured domestically.

Argentine Railroads in 1970 began a program of equipment modernization (54% of its equipment was more than 10 years old in 1973) that should continue during the next few years Of the total planned investment of $340 million for this program during the 1973-77 period, $43.2 million has been allotted for MHE&S purchases, including three bridge cranes. Argentine Railroads also plans to acquire hydraulic jacks, self-propelled handcars, tow cars, cross-tie loaders, and other equipment.

The company's program to create an integrated system of container transportation should result in the expanded use of container handling equipment. Portal cranes were installed in 1971 in Buenos Aires, Resistencia, and Salta. Other locations that are likely to be interested in purchasing portal pedestal cranes in the near future are Rosario, Cordoba, San Miguel, Mendoza, and Posadas. Heavy-capacity forklift trucks will be part of the container systems established in each of these cities.

Argentine Railroads also has undertaken the construction of a rail yard in Buenos Aires' Central Market. This market, now in an early stage of development, is expected to begin operation in 1975. It will handle all fruits and vegetables for the Buenos Aires metropolitan area and is expected to sell 25 million tons of produce annually.

Argentine Railroads will use about 400 freight cars per day to move 30% of the produce to the market. The railroad company plans to invest approximately $8 million to ensure the smooth handling of its share of the products.

Steel.—Argentine steel production in 1971 amounted to 2 million tons, representing over 50% of total domestic consumption. The 14 major companies in the Argentine steel industry expect to increase production at an average annual rate of 25% from 1973 through 1975. The anticipated output of 5.5 million tons in 1975 should satisfy 88% of total domestic consumption of steel in that year. At the projected 1975 production level, the Argentine steel industry should be able to satisfy 90% of the country's demand for finished rolled products.

The Government-sponsored Argentine Steel Industry Plan aids firms in expanding their production capacity. Investments under the plan, which are expected to exceed $700 million in the 1970-75 period, should cover projects such as the expansion of the steel production of Sociedad Mixta Siderurgia Argentina (SOMISA) from 1.1 to 4 million tons annually and installation of blast furnaces and hot rolling steel mills at Propulsora Siderurgia, S.A., in Ensenada.

The production capacity of Establecimientos Altos Hornos Zapla is expected to triple, going from 100,000 to 300,000 tons annually; a 35-ton electric furnace is planned for the Acindar steel mill, to increase its production from 22,000 to 77,000 tons per year.

Supported by the Government plan, firms in the steel industry intend to purchase the most sophisticated MHE&S equipment available and expect to purchase most of their requirements from foreign suppliers. Advanced systems and heavy-duty equipment that can fill the industry's needs for quality and durability are of special interest to this sector.

The firm Cura Hermanos, S.A., installed a 30-ton bridge crane in 1972 and planned to purchase another in 1973 for handling scrap. Most of the tackles, lift trucks, and conveyors, as well as derrick, bridge, pedestal, and automatic movable cranes, now in use in Argentina's steel industry are imports. The demand for these types of equipment is expected to accelerate rapidly in the next few years.

SOMISA, which is 99% Government-owned, is Argentina's leading steel producer. The company's 1970 output of 1.1 million tons represented over half of total Argentine production in that year.

Located near Buenos Aires in the vicinity of San Nicolas, the SOMISA plant covers 1,400 acres and employs 9,200 persons. It includes a port, a coke plant, a blast furnace, a steel mill, a rolling mill, and auxiliary services.

SOMISA utilizes a wide variety of cranes including 45-ton swivel hook cranes, 30-ton bridge cranes, 5- to 10-ton button-panel bridge cranes, 5- to 15-ton wheel-mounted, self-propelled telescopic boom swiveling cranes, fixed-boom cranes, and truck cranes.

SOMISA's conveying equipment includes chain conveyors with capacities of up to 70 tons per hour and aerial conveyors attached with 1-ton-capacity hooks. Industrial vehicles utilized include both internal combustion and electric-powered forklift trucks.

SOMISA's plan to increase their capacity to 4 million tons annually will require substantial purchases of MHE&S equipment. Total investment in materials handling equipment scheduled for delivery to SOMISA during the 1973-75 period is projected at over $20 million. U.S. suppliers should find SOMISA a potential customer for automatic components and parts, stacker-retrievers, retriever hoists, cranes, and conveying equipment.

Meat packing.—Argentina's meat packing industry, which includes 150 firms with a total employment of about 65,000, is one of the most important sectors of the country's economy. Meat products account for 20% of Argentina's total exports, and domestic per capita beef consumption is the highest in the world. Production in the industry has remained at a fairly constant 2 million tons per year since 1955, and annual meat exports generally represent 20 to 25% of total production. Meat exports were valued at $686 million in 1972.

Most of the equipment in use in Argentina's meat packing plants was installed when the plants were built over 50 years ago. Consequently, many of Argentina's meatpackers have undertaken long-term investment programs to replace their obsolete equipment and to increase their efficiency and productivity to meet the rising world demand for beef. The need for more extensive processing of meat products prior to export requires the application of advanced processing technology, and this is stimulating an increase in purchases of advanced materials handling equiment and systems in this market sector. Many plants are replacing trucks and handcarts with aerial chain pumps, toboggans, conveyor belts, and pneumatic tubes.

Because of strict sanitary regulations, materials handling equipment for use in the meat packing industry must be made of stainless steel. Equipment that could be successfully marketed by U.S. manufacturers includes aerial chain-pump receptors, platform scales, continuous chain-pumps, rack stackers, and electronically controlled processing systems. Many of the larger meat-packing concerns are considering complete materials handling systems.

Argentina's largest meat-packing enterprise, Corporacion Argentina de Productores de Carne (CAP), exported meat products valued at $82 million in 1972. This represented 12% of the country's total meat exports. CAP, headquartered in Buenos Aires, has nine industrial plants throughout the country and two regional distribution centers.

CAP has been an innovative leader in the Argentine meat-packing industry and in 1972 spent $8 million modernizing seven of its nine plants. Part of the company's planned $23 million investments for 1973/74 has been designated for the construction of an automated meat-packing plant near Buenos Aires. The new plant will include extensive materials handling equipment for processing meat products for the European and American markets.

Grains storage.—Argentina has 9 port facilities and 78 inland plants for the storage of cereal grains. These installations include 72 elevators with a total storage capacity of 1.5 million tons, 26 underground silos holding a total of 2.1 million tons, and 22 metal silos with a total capacity of 200,000 tons.

A current shortage in storage capacity and an expected increase in production have stimulated a major investment program by the Argentine Government's National Grain Board, which plans to spend $25 million on new storage plant construction at 22 locations during the 1973-74 period.

These projects include a $5 million plant to be built at Rosario, two $2.4 million facilities at San Pedro and Puerto Nuevo, and a $2 million installation at San Nicolas. Concepcion de Uruguay is the planned site for a $1.5 million storage plant, and a $1.2 million complex is scheduled for Barranqueros.

Investments in MHE&S by the National Grain Board amounted to $5.2 million in 1971 and grew to $6 million in 1972. Based on planned investment in additional storage capacity, purchases of materials handling equipment and systems were estimated at $5.6 million in 1973 and are expected to climb to $6.8 million in 1974.

Modern materials handling systems are being installed in larger port storage facilities, and U.S. manufacturers are expected to continue to supply nearly all of this equipment. An integrated MHE&S system is planned for the storage facility under construction at San Nicolas, and the expansion plans for the Bahia Blanca elevator installation include the purchase of an advanced grain handling system.

Many of the other facilities planned or under construction are expected to utilize more traditional materials handling equipment supplemented by some advanced specialized equipment. U.S. suppliers of electronic platform scales and level indicators should find a growing market in Argentina's rapidly expanding grain storage industry.

Competitive Environment

The Argentine materials handling equipment industry, aided by Government "buy national" policies and favorable tariff legislation, is growing rapidly. Production increased from $30.7 million in 1971 to an estimated $49.2 million in 1973, representing 76% of Argentina's MHE&S market.

Projected to grow at an average annual rate of 19% for the 1973-77 period, production is expected to reach $98 million in 1977 and may account for 83% of the total market in that year.

Foreign firms have been leaders in the development of the Argentine MHE&S industry to date and continue to play an important role. Although all lightweight traditional equipment is produced by domestic companies, 90% of the production of medium-weight industrial vehicles and 20% of medium-weight lifting, loading, and conveying equipment is supplied by subsidiaries and licensees of foreign firms.

Domestic production of sophisticated heavy-duty equipment is increasing as Argentine firms conclude licensing agreements with U.S. and European firms. Autoelevadores Argentinos, S.A., is producing electric forklift trucks under license from the Cleveland-based manufacturer, Elwell-Parker Electric Co., and Fabrica Argentina de Aparejos, S.R.L., manufactures tackles under license from the "Lug-All" Company of Pennsylvania.

Tega Ind. Y Com., S.R.L., produces bridge cranes and electric monorails under license from the British manufacturer Herbert Morris, Ltd. In-

Table 3.—U.S. exports to Argentina of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, Loading, and Conveying Equipment				
Overhead cranes, etc.	—	—	1,176	3,629
Parts for above	125	37	330	2,159
Other cranes, unmounted	883	648	1,736	212
Other crane parts	46	72	139	46
Subtotal, cranes and parts	1,054	757	3,381	6,046
Hoists	111	115	61	54
Parts for hoists	17	31	6	26
Derricks	14	91	28	—
Winches	32	114	279	—
Parts for above, etc.	626	1,465	1,752	1,561
Hydraulic jacks, parts	21	36	18	—
Other jacks and parts	22	115	17	—
Other lifting equipment	29	102	139	21
Subtotal, lifting equipment	872	2,069	2,300	1,662
Elevators, escalators	246	31	1	—
Parts for above	22	154	22	13
Gravity conveyors	1	10	22	—
Overhead conveyors	9	—	67	—
Pneumatic conveyors	14	66	2	—
Wheeled conveyors	—	—	—	—
Other conveyors	152	382	150	24
Parts for conveyors	181	396	167	37
Subtotal, conveyors and parts	625	1,039	431	74
Used and rebuilt tractor shovel loaders (TSL)	20	23	—	—
Front-end loaders for mounting on TSL	9	59	—	—
Subtotal, loaders and used TSL	29	82	—	—
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	—	—	—	—
4- wheel drive, -1	35	80	67	14
4-wheel drive, 1-1.49	—	7	—	—
4-wheel drive, 1.5-1.99	367	414	—	—
4-wheel drive, 2-2.49	1,409	758	23	351
4-wheel drive, 2.5-3.49	973	781	—	—
4-wheel drive, over 3.5	783	2,292	1,766	45
Subtotal, wheeled TSL	3,567	4,332	1,856	410
Total, lifting, loading, and conveying equipment	6,147	8,279	7,968	8,192
Industrial vehicles (IV)				
Walking and powered IV	2	39	1	21
Electric-powered IV	101	160	274	79
Gasoline-powered IV	73	95	122	17
Other-powered IV	62	190	238	—
Portable stackers	14	—	—	—
Parts for above	932	993	1,260	1,005
Total, industrial vehicles	1,184	1,477	1,895	1,122
Total, materials handling equipment	7,331	9,756	9,863	9,314
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng. H.P.	—	83	—	—
45-59.9 eng. H.P.	—	18	—	—
60-89.9 eng. H.P.	66	58	75	39
Over 89.9 eng. H.P.	600	775	430	359
Subtotal, tracklaying TSL	666	934	505	398
Underground loaders	5	206	—	—
Parts for above	13	—	1	—
Oil field rod-lift equipment	64	332	18	—
Oil field derrick, parts	24	19	—	269

Table 3.—U.S. exports to Argentina of materials handling equipment, 1969-72—Continued

(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Other field lift equipment	130	111	56	25
Farm elevators	—	—	—	—
Parts for	—	1	—	—
Automobile lifts	—	—	11	—
Underground mine conveyors	—	—	—	398
Subtotal, other equipment	236	669	86	692
Total, tracklaying and other equipment	902	1,603	591	1,090
Grand Total, mechanical handling equipment	8,223	11,359	10,454	10,404

Source: *Exports, Commodity by Country*, FT-410—1969, 1970, 1971, and 1972, U.S. Department of Commerce, Bureau of the Census.

dustrias Chardon, S.A.I.C.I.A., producing conveyors, and Ascensores Magnus, S.A.C.I., manufacturing freight elevators, operate under German licenses.

Among Argentina's major manufacturers of lifting, loading, and conveying equipment are Famya, S.R.L., which supplies conveyors, monorails, cranes, elevators, pulleys, and other equipment especially to the grain storage industry. Conveyors, S.A., produces conveyors for the automotive industry, and Comestarsa, S.A.I.C., supplies various types of cranes to the automotive and steel industries.

Other manufacturers include Jonach Argentina, S.A., another crane supplier for the steel industry; Febo, C.I.F.I.S.A., the principal supplier of gantry cranes to the automotive industry; and Tega Ind. Y Com. S.R.L. Two companies, Sampi, S.A.I.C., and Eximia Industrial Clark Argentina, S.A.I.C.I.F. (a U.S. overseas subsidiary), produce industrial vehicles and lifting, loading, and conveying equipment and are major suppliers to the meatpacking industry.

Foreign (other than American) suppliers to the Argentine market accounted for over half of the total MHE&S import market in 1971. German-based companies ranked second to U.S. companies and included Arnold & Stolzenberg; H. Jungheinrich & Company, Steinbock, GmbH; Miag Muhlembau & Industrie, GmbH; and Demag Fordertechnik. Other important MHE&S exporters to Argentina are Britain's Lansing Bagnall, Ltd., and Italy's Ansaldo, S.A.

The Argentine Government actively promotes the development of a local materials handling equipment industry. Argentina's "buy national" law, Law No. 18875/70, requires Government-owned enterprises to purchase equipment from local manufacturers when domestic products meet the technological requirements of the purchaser.

In addition, the Industrial Promotion Law, Law No. 19904/72, has established a program of economic incentives to assist industries in producing import substitutes and to incorporate advanced technologies into production processes. These incentives are limited to enterprises owned by Argentine nationals.

The most important Argentine Government policy favoring the domestic MHE&S industry is the maintenance of high import duties. Argentina uses the Brussels Tariff Nomenclature classification. Duties range from 80 to 120% for goods that can be produced domestically and between 10 and 15% for equipment that is not manufactured locally. Information on specific duty rates and other import regulations may be obtained from the Domestic and International Business Administration (DIBA-242), U.S. Department of Commerce, Washington, D.C. 20230.

Other taxes levied on imports include a statistical tax, calculated at 15% of the equipment value, and a metals tax assessed at a rate of 4% on equipment in BTN 84.22 and at 8% on equipment in BTN 87.07. A recently modified sales tax varies in magnitude to a maximum of 8% and applies to domestically produced goods as well as imports.

Regulations covering the financing of imports are established by the Argentine Central Bank. Imports that exceed $10,000 in value require an initial payment of at least 5% of the total purchase price f.o.b. on placing an order and another minimum 10% payment on delivery. Payment of the balance must be made in equal periodic installments that vary according to the total value of the imported equipment. Special arrangements for payment for imports valued at over $1 million must be made with the Central Bank.

Current regulations require the submission of international bids for all prospective imports, and recent international monetary realignments should benefit U.S. suppliers. American-supplied equipment requires delivery times approximating those of other foreign suppliers, and Argentine end-users are satisfied that U.S. firms can deliver equipment within specified timeframes.

Argentina lacks personnel trained in the assembly and operation of advanced materials handling systems. Suppliers can expect to be required to provide some training of local personnel as part of any sales contract. In addition, Argentine end-users require assurance that service will be prompt and that spare parts will be readily available.

The terms of warranties are generally established at the time of international bidding and vary from 90 days to 2 years, depending on the type of equipment. Typical warranties are 90 days for industrial vehicles and 6 months to 2 years for lifting, loading, and conveying equipment. Except for cranes, leasing is rare.

Technical Requirements

The Argentine Government has established no standards that apply to materials handling equipment and systems. American standards are accepted in Argentina.

Argentina's electric power characteristics are 220/380 volts, 50 hertz, 3-phase, 3 or 4 wires. Weights and measures are based on the metric system. Information on technical standards can be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230.

"The Market for Materials Handling Equipment and Systems in Argentina," DIB 73-12-507, May 1973.

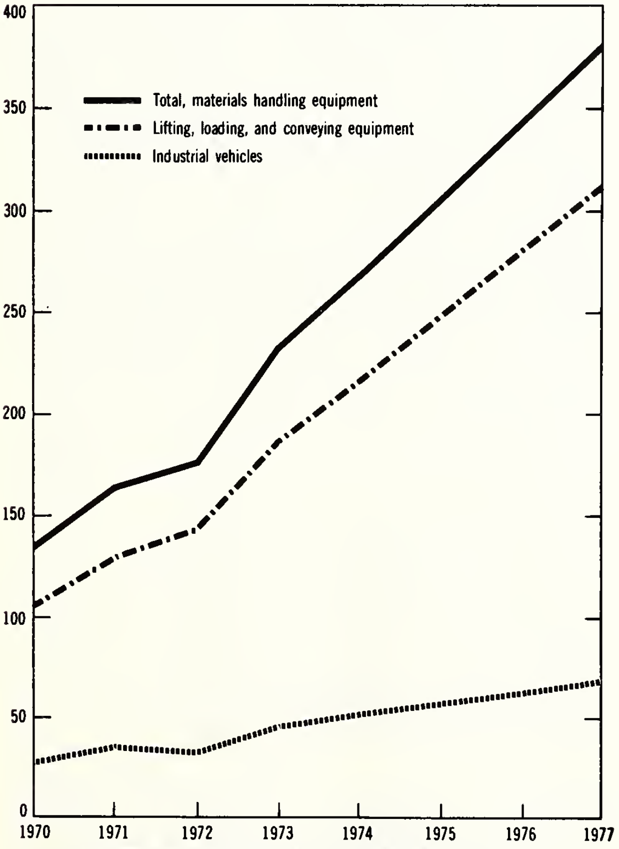
Australia

The Australian market for materials handling equipment and systems (MHE&S) is expanding rapidly as high labor costs, combined with a shortage of unskilled workers, is stimulating new interest in efficient production methods.

Rising land prices are forcing industry to seek maximum use of space in factories and warehouses. A scarcity of industrial sites in the large cities has led the government to introduce a national decentralization plan to encourage industry to move into rural areas.

Australia: Size of market for materials handling equipment, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by the Office of International Marketing, U.S. Department of Commerce, official Australian statistics, and trade estimates.

Implementation of the decentralization plan will require significant capital expenditures by Federal agencies and private firms, and will generate substantial demand for materials handling equipment.

The Australian market for materials handling equipment grew from $135 million in 1970 to $177 million in 1972, an increase of 31% (see table 1). Sales are expected to grow at an average annual rate of 16.5% and to exceed $380 million in 1977.

Lifting, loading, and conveying equipment accounts for about 80% of the MHE&S market. Sales of such equipment, which grew from $106 million in 1970 to $143 million in 1972, an increase of 35%, should reach $311 million in 1977. Sales of industrial vehicles rose 19% between 1970 and 1972, going from $28 million to almost $34 million. Based on a projected annual growth rate of over 15%, the market for industrial vehicles should approach $69 million in 1977.

Australia imported 21% of its *materials* handling equipment in the 1970-72 period. Purchases of such equipment from foreign suppliers totaled $34 million in 1972 and are expected to reach $62 million in 1977. This projection is based on an average growth rate of 13% in the period 1973-77.

The United States in 1971 exported *mechanical* handling equipment valued at $23.1 million, or 43.4% of the Australian import market (see table 2). The United Kingdom in 1971 ranked second to the United States with 26.5% ($14.1 million), followed by Japan with 10.1% ($5.4 million), Germany with 8.3% ($4.4 million), and Sweden with 3.2% ($1.7 million).

Statistics taken from *Exports, Commodity by Country,* FT-410, an annual publication of the U.S. Census Bureau, show in detail U.S. exports to Australia of materials handling equipment in selected years (see table 3).

Specific Sales Opportunities

A recent research study conducted in Australia for the U.S. Department of Commerce indicates favorable sales opportunities for American manufacturers of the following products:

Lifting, Loading, and Conveying Equipment

- Large-capacity, wheel-type, integral tractor-shovel loaders
- Heavy-duty, large-capacity cranes
- Jib cranes
- Electric hoists with lift height over 40 feet and load capacity over 5 tons
- Chair hoists with load capacity between ½ ton and 2 tons
- Pneumatic hoists

Industrial Vehicles

- Forklifts, internal combustion, with load capacity over 3,000 lbs.
- Forklift attachments such as:
  overlifts
  roll clamps
  loader attachments
  drum clamps
- Transmission and axle components for forklift trucks
- Straddle trucks for container handling
- High-reach stacker trucks

Systems and Specialized Equipment

- Electronic weighing equipment and quality control units
- Electronic beam cutouts
- Specialized conveyor units
- Palletizing systems
- Container handling systems

Lifting, loading, and conveying equipment.—Large-capacity, wheel-type, integral tractor-shovel loaders will provide the best sales potential for American manufacturers of lifting, loading, and conveying equipment. The United States is the acknowledged leader in supplying loaders with bucket capacities in excess of 3.5 cubic yards. Australian users have come to depend on the reliable performance and superior durability of these American-made products.

Heavy-duty, large capacity cranes produced by U.S. firms are considered superior by Australian consumers. An increasing number of industries are using cranes in their factory operations, and jib cranes are needed by Australia's booming construction industry. The increasing height of new buildings indicates a growing market for hydraulic cranes with capacities of 80 tons or more.

Industrial vehicles.—Australia bought over 40% of its industrial vehicles from other countries in 1970. Forklift trucks, particularly internal combustion vehicles with 3,000- to 6,000- and 10,000- to 15,000-pound capacities, will provide the best sales potential for American manufacturers of industrial vehicles. Part of the increasing demand for forklifts can be attributed to their versatility when fitted with various attachments.

American manufacturers can be assured of a growing market for such items as overlifts, roll clamps, loader attachments, and drum clamps. The popularity of U.S.-made forklift trucks in Australia creates a demand for American-made parts, particularly transmission and axle components. U.S.

Table 1.—Australia: Size of market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	92.9	116.2	130.3
Imports	18.3	21.8	22.6
Exports	4.7	8.3	9.6
Market size[2]	106.5	129.7	143.3
Industrial vehicles			
Production	17.7	21.2	23.8
Imports	11.7	14.7	11.5
Exports	.9	1.7	1.5
Market size	28.5	34.2	33.8
Totals, materials handling equipment			
Production	110.6	137.4	154.1
Imports	30.0	36.5	34.1
Exports	5.6	10.0	11.1
Market size	135.0	163.9	177.1

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[1] Bureau of International Commerce estimates based on market research.
[2] Market size equals production plus imports minus exports.
Source: Production and foreign trade values based on official statistics published by the Australian Bureau of Census and Statistics.

Table 2.—Exports of mechanical handling equipment to Australia by principal suppliers, 1969-71 [1]
(in millions of U.S. dollars)

	1969 Market Share		1970 Market Share		1971 Market Share	
	value	percent	value	percent	value	percent
United States	25.3	60.7	29.7	43.9	23.1	43.4
United Kingdom	8.0	19.2	8.7	12.9	14.1	26.5
Japan	2.2	5.3	20.4	30.1	5.4	10.1
Germany	1.9	4.6	3.8	5.6	4.4	8.3
Sweden	3.4	8.2	1.1	1.6	1.7	3.2
Others	.9	2.0	4.0	5.9	4.5	8.5
Total	41.7	100.0	67.7	100.0	53.2	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by OECD, based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

components also are incorporated into industrial vehicles assembled in Australia.

Australian consumers have been pleased with the special design and performance characteristics of U.S.-origin straddle trucks for container handling. The market for these vehicles should continue to grow as containerization becomes more widespread. High-reach stacker trucks are among the industrial vehicles needed for high-density warehouse operations.

Systems and specialized equipment.—American exporters will find a good market in Australia for advanced solid-state electronic equipment, particularly weighing machinery, quality control devices, and electronic beam cutouts. There is a rapidly growing market for specialized conveyor units and components that can be integrated into conveyor-based processing systems.

Both containers and pallets are being used more widely in Australia. U.S. manufacturers will find good outlets for all types of container handling and palletizing systems.

End-User Analysis

The steady rise in capital expenditures by the government and by private industry points to increased investment in materials handling equipment and systems in Australia. Capital expenditures by the various levels of government reached $3.9 billion in 1972; private enterprises invested $7.1 billion. Private capital investment is projected to reach $11 billion in 1977.

New markets for materials handling equipment are developing as many Australian businessmen turn to further mechanization in an effort to cope with rising costs. Unskilled and semiskilled workers are becoming scarce, and labor costs are soaring. The average wage in Australia increased 52% between 1966 and 1972.

Prices for industrial land are growing, especially in the prime locations of Melbourne and Sydney and in other coastal areas where the population is heavily concentrated. Since management must efficiently utilize available building sites, multistory factories and warehouses are being constructed, expanding the requirements for a large variety of materials handling equipment.

The typical Australian end-user is just beginning to appreciate the benefits of sophisticated systems and other advanced technology. The government's industrial decentralization plan should provide many opportunities for businessmen to modernize their operations in new plants to be built under the plan. Large companies, particularly subsidiaries of foreign firms, already are planning large-scale investments in materials handling projects.

Australia in 1971 had 62,950 factories; 95 of the factories employed more than 1,000 persons. Major sectors interested in acquiring materials handling equipment and systems include airlines, automotive manufacturing, food processing, trucking and warehousing, and the wholesale trade in nondurable goods.

Airlines.—The airline industry uses some of the most advanced materials handling equipment in Australia. The baggage handling systems rank among the best in the world, and warehouse and airline service vehicles are among the most efficient models available.

All interstate air transport within Australia is provided by two airlines—the government-owned Trans-Australia Airlines (TAA) and a private line, Ansett Airlines of Australia. In addition, 17 airlines, including the government-owned Qantas Airways, provide international air service to Australia.

The airlines serving Australia carried 6.6 million domestic passengers and 1.3 million international travelers in 1971. Department of Civil Aviation figures indicate that domestic passenger traffic in Australia is growing at a rate of 10% per year, while international traffic has maintained an average annual growth rate of 15% since 1964.

The latest available figures show domestic freight at 89,900 tons in 1969, up 28% from 1964. International air freight from Australia in 1969 totaled 19,000 tons, up 80% since 1964. The number of international and domestic flights is expected to grow at an average annual rate of 12% from 1973 through 1977.

The airlines spent $4 million in 1971 for materials handling equipment, including equipment for the Melbourne International Airport and equipment needed to service the newly introduced jumbo jets (Boeing 747's).

The airlines spent $893,000 for belt conveyors in 1972, $1.5 million for industrial trucks, and $476,000 for containers.

Annual expenditures for materials handling equipment and systems through 1977 should total at least $4 million, most of it going for modernization and replacement of vehicles and expansion of warehouse facilities. Industrial trucks used in warehouses and for servicing planes should continue to provide the largest market in this sector, with sales of $2.5 million expected in 1977.

Both TAA and Ansett will need sophisticated warehouse equipment, including racking and conveyor systems, to handle their increased parts inventory when their new group of jumbo jets (McDonnell Douglas DC-10's) is introduced in 1974. Sales of belt conveyors are expected to reach $1.8 million in 1974 when the International Air Terminal at Sydney extends its conveyor system to accommodate domestic passengers.

Qantas Airways installed a fully automatic high-bay warehouse at Sydney Airport in 1972, primarily to store the increased volume of spare parts required by the new fleet of jets. This warehouse, the most advanced of its type in Australia, was designed and built by Fisher Engineering, Ltd. (U.K.), at a cost of approximately $800,000. The Qantas system uses computer-controlled stacker-retrievers that provide 107,000 square feet of storage in three bays.

Qantas calculates that it saved $1 million in land and construction costs by building this high-density warehouse instead of the traditional one-story building. The new warehouse also has helped to reduce the company's labor costs. The success of this sophisticated storage system should stimulate interest in advanced materials handling technology among end-users throughout Australian industry.

Automotive manufacturing.—The automotive manufacturing industry in Australia is dominated by subsidiaries of foreign automakers, including such U.S. firms as the General Motors Corp., the Ford Motor Co., and the Chrysler Corp., and the British-owned Leyland Motor Corp. Australian factories in 1972 produced 336,000 cars, 52,000 station wagons, 34,000 utility vehicles, 22,000 panel vans, and 3,000 trucks.

Capital investments in plant and machinery fluctuate in response to consumer demand, new-model tooling requirements, and long-range plans. These investments reached $79 million in 1972 and should vary between $85 and $100 million per year from 1973 to 1977.

The automotive industry uses the most sophisticated manufacturing techniques in Australia and is constantly upgrading its production procedures to increase efficiency and reduce man-hours. The industry spent approximately $8 million for MHE&S in 1971, and minimum annual expenditures of $8.5 million are forecast for 1973-74.

Sales of roller and belt conveyors amounted to $1.8 million in 1972 and are projected to reach $2.8 million in 1977. Purchases of forklift trucks and accessories were $893,000 in 1972 and should exceed $1 million in 1977. The market for traveling cranes is expected to reach $355,000 in 1977.

American exporters of MHE&S will find good sales opportunities for warehouse and production line equipment in the automotive manufacturing industry. The increasing need for better customer service and the proliferation of new models have caused a sharp expansion in the volume of spare parts that must be stored.

Rising labor costs, high-volume production, and a growing scarcity of skilled labor have heightened the need for automated operations, providing a particularly good market for conveyor systems.

Materials handling equipment will also be needed in the new Australian factories being planned by two Japanese firms, the Nissan Motor Co. and Toyota, Inc.

The Ford Motor Co. installed a semiautomated conveyor system for the V8-engine assembly line at its Geelong plant in 1972. The system was manufactured in Sydney under license from the U.S. firm Jervis B. Webb and was installed by the Conveyor Company of Australia, Ltd.

The system consists of three conveyors, including an overhead chain conveyor, and forms an integral part of the engine manufacturing process, since assembly operations take place while the engine is moving.

Food processing.—Over 193,000 people in 4,900 establishments were engaged in producing food, beverages, and tobacco in Australia in 1970. New capital investment reached $206 million in 1972 and should grow at an average annual rate of 6% through 1977. The food processing industry spent nearly $11 million on materials handling equipment in 1971 and is expected to purchase approximately $13 million of MHE&S in 1973.

Intense competition in some sectors of this industry, particularly in frozen foods and canned goods, has contributed to the reorganization and modernization of plants in order to reduce unit costs. Few Australian food processing companies invest large sums in research and development, and firms that have remained competitive have done so largely with the assistance of foreign technology.

The interest in modernization should remain high since rising labor costs in this industry are difficult to pass on to the consumer. In other sectors of the industry, notably sugar and meat, recent sizable increases in Australian exports have raised profits sufficiently to allow major producers to reequip processing plants.

The greatest demand for MHE&S in the food industry has been for equipment used in production, but a growing realization of the benefits to be derived from the systems approach to warehousing and raw materials handling should soon lead to purchases of more diversified equipment.

Purchases of forklift trucks amounted to $1.8 million in 1972 and should reach $3.6 million in 1977. The market for conveyors should continue to expand as the industry is modernized. Expenditures for belt conveyors totaled $834,000 in 1972 and should reach $1.8 million in 1977. Roller-type conveyors accounted for sales of $298,000 in 1972, and sales should top $568,000 in 1977. American producers can also expect a growing demand for pallet and racking warehouse systems and for electric hoists.

One of the larger companies in the food processing industry is Cadbury Fry Pascall Australia, Ltd., a British-owned firm with total assets approaching $51 million. Cadbury recently expanded its warehouse in Brisbane, installing three 52-foot-high tiers of steel racking in a 7,500-square-foot storage area. The mobile section of the warehouse is built around a Norwegian Munck Palstak crane.

This facility has become the prototype for a planned program of warehouse expansion throughout the Cadbury organization. The Brisbane installation is comparatively sophisticated by Australian standards, and other leading companies, such as Unilever Australia (Holdings) Pty., Ltd., are contemplating similar facilities. Consequently, the use of advanced materials handling equipment and systems in the food processing industry is expected to grow rapidly in the coming decade.

Trucking and warehousing.—The Australian trucking and warehousing industry has become a profitable, fast-growing competitor of rail and shipping services. New capital investment in 1972 was estimated as high as $50 million, and annual investment is expected to increase at a rate of 14% for the next year or two. Purchases of materials handling equipment and systems could reach $8.5 million in 1974, up more than 20% from 1971 levels.

Investments in heavy-duty industrial trucks totaled $1.8 million in 1972 and should approach $4 million in 1977. The market for traveling cranes should rise from $298,000 in 1972 to over $1 million by 1977. Roller and belt conveyor purchases may surpass $1 million by 1977, up from $596,000 in 1972. Heavy-duty overhead mounted cranes and large-capacity monorail hoists should also be in demand by trucking and warehousing firms.

Since storage facilities near rail and shipping terminals in the major cities have become inadequate for the increasing volume of goods handled, major trucking companies are moving their warehouses into outlying areas. The relocation provides firms with an excellent opportunity to incorporate advanced concepts of warehousing into their new establishments. Consequently, U.S. suppliers should find a good market for warehouse racking systems and associated high-reach stacker trucks.

The advent of containerization gave great impetus to the trucking and warehousing industry, and fully integrated container handling systems are now operated by such larger companies as Thomas Nationwide Transport, Ltd. (TNT), Brambles Industries, Ltd., and Ansett Transport Industries, Ltd. Container purchases amounted to $1.2 million in 1972 and are expected to approach $4 million in 1977. Containerization also has led to an increased demand for heavy equipment, sophisticated warehousing systems, straddle trucks, and palletizing systems.

A unique concept in freight handling has been implemented by Brambles Industries, one of the major trucking and warehousing companies in Australia. This firm, based in Sydney, is building a national chain of Brambles Rail Terminals to facilitate the shipment of goods through the combined use of trucks and railroads. The first terminal has been built in Brisbane, and a second is underway in Adelaide. Other large rail terminals are planned in Sydney, Melbourne, and Perth.

These installations are not highly sophisticated, despite their use of modern container handling equipment. Goods are transferred from one mode of transportation to the other inside a clear span building, or they are temporarily stored in an adjacent warehouse area.

Other large Australian trucking and warehousing firms, such as TNT, are entering the field of integrated freight handling, assuring a continuing and sizable market for U.S. producers of container handling, warehousing equipment, and a variety of heavy-duty industrial vehicles.

Wholesale trade in nondurable goods.—This industry consists of wholesalers of food, beverage, and tobacco products. It is dominated by a small number of companies operating at the state level; the remainder of the industry comprises smaller firms handling a limited range of products.

Wholesalers of nondurable goods employed 56,300 people in 4,870 establishments in 1969, the latest year for which information is available. Sales of $3.9 billion were reported in 1969, and fixed capital expenditures totaled $30 million. The growth rate of capital expenditures is projected at 5% annually between 1972 and 1977.

Wholesalers of nondurable goods purchased MHE&S valued at $2.7 million in 1971. Purchases in 1974 are expected to total $3.7 million. Belt and roller conveyor purchases reached $596,000 in 1972 and are projected to rise sharply to $1.5 million in 1977. Purchases of forklift trucks and reach trucks should nearly double between 1972 and 1977, rising from $715,000 to $1.4 million. Investments in containers, container handling equipment, and racking were valued at $476,000 in 1972 and may increase to $1.3 million in 1977.

The food industry is highly competitive and has declining profit margins at each step of its distribution chain. The profit margin for wholesalers of nondurable goods is further reduced by competition from a growing number of major national retail chains with direct purchasing policies. Restricted profit margins, combined with the increasing costs of labor and transport, are encouraging the development of efficient handling, storage, and distribution methods.

U.S. suppliers will find a demand in the Australian nondurable goods wholesale trade for palletizing systems including shrink wrapping, low-capacity hoists, and narrow-aisle reach trucks. Demand also will remain high through 1977 for truck loading and unloading equipment, including specialized forklifts and low-capacity jib cranes.

Davids Holdings Pty., Ltd., is the largest grocery distribution center in Australia, handling 6,500 separate items, including general groceries, dairy goods, frozen foods, tobacco products, and alcoholic beverages. The plant supplies more than 400 clients a week and employs 120 factory workers plus 146 persons who serve as drivers, office workers, or field staff.

Davids has recently built an automated warehouse, the only one of its kind in the country. The computer-controlled mechanized order-selection system was installed by the U.S. firm S. I. Handling Systems, Inc., at a cost of $1.7 million. The system has resulted in savings of 5 cents per case lot; it also has reduced damage by 70%, and pilferage has been nearly eliminated.

The success of this warehouse may encourage other large wholesalers to build similar facilities, thus providing a good market for U.S. manufacturers of advanced materials handling equipment and systems.

Competitive Environment

The Australian economy is recovering from a period of inflation, high unemployment, and low economic growth that occurred in 1971 and 1972. The problems of this period were reflected in record rates of savings and capital reserves and reduced capital formation, a situation directly affecting demand for materials handling equipment.

Thus, the Australian materials handling industry experienced a slump. Manufacturers were not expanding their operations, and many sectors of the industry had excess capacity. Most factories, as of early 1973, were operating only one production shift, the main exception being firms producing equipment of the type that can be used in the construction industry, which is still experiencing boom conditions.

Domestic manufacturers provided an estimated 87% of Australian requirements in 1972. The majority of these local producers are multinational companies, many of them owned wholly or partly by U.S. firms.

Rapistan Australia Pty., Ltd., a subsidiary of the British firm J. H. Fenner of Hull, is generally considered the leading manufacturer of conveyors in Australia.

Other important suppliers in the competitive conveyor industry include Portec (Australia) Pty., Ltd., a subsidiary of Portec, Inc. (U.S.), and the Conveyor Company of Australia Pty., Ltd., a subsidiary of K. G. Coles Pty., Ltd.

These and other members of the Conveyor Equipment Manufacturers Association produce 72 different types of conveyors, specializing in either bulk material or unit load conveyors. Most of their sales consist of systems designed specifically for the user. The conveyor industry expects production to grow 10 to 15% per year through 1976.

Less foreign capital is invested in crane and hoist manufacturing in Australia than in any other segment of the domestic MHE&S industry. Two Australian firms, Lenix and Monosteel, manufacture electric hoists; Demag Industrial Equipment Pty., Ltd., a long established Australian company, produces winches, hoists, and material towers and associated equipment. Its major competition comes from Guest, Keen and Nettlefolds (Australia) Ltd., a subsidiary of GKN Ltd., of the United Kingdom, and from other multinational firms such as Walco, Davleco, and Cromco.

The leading suppliers of heavy mobile cranes are Coles Cranes, Ltd., a subsidiary of The Steel

Group, Ltd., (U.K.), and two Australian firms, Favelle-Mort, Ltd., and Marfleet & Weight, Ltd. The primary foreign competition comes from Harnischfeger of Australia Pty., Ltd., a subsidiary of the P. and H. Harnischfeger Corp. (U.S.), and Kobe Co. of Japan. Australian crane production is expected to increase approximately 20% per year from 1973 to 1977.

Seven of the nine firms manufacturing industrial trucks in Australia in 1972 were subsidiaries of foreign companies, five of them U.S. companies. The U.S. firms are Caterpillar Tractor Co., Clark Equipment Co., Crown Control Corp., Hyster Co., and International Harvester Co.; the two British representatives are the Owen Organisation and Lansing Bagnall, Ltd.

Australian-based manufacturers generally purchase components for local assembly from the overseas affiliates. Based on present growth rates, production of industrial vehicles should reach $50 million a year by 1977. Some attachments for industrial trucks are produced locally, but current demand for these products is not sufficient to justify the investments in tooling and techniques necessary for efficient manufacture.

The local production of shelving and warehouse supplies is dominated by two Australian firms, Acrow Pty., Ltd., and Brownbuilt, Ltd. Their principal competition comes from two subsidiaries of U.K. firms, Guest, Keen and Nettlefolds and Dexion (Australia) Pty., Ltd. The two leading manufacturers of containers are Freighter Industries, Ltd., and Freuhauf Trailers (A'Aisa) Pty., Ltd., both Australian companies.

The value of lifting, loading, and conveying equipment exported by Australia reached an estimated $9.6 million in 1972, up 90% from 1970. Industrial vehicle exports grew from less than $1 million in 1970 to an estimated $1.5 million in 1972, with parts accounting for 70% of total sales.

Many American and British firms have established subsidiaries in Australia. Swedish, German, and Japanese manufacturers generally prefer to work through agencies rather than set up assembly operations or work through licensing agreements. Japanese companies represented in Australia include Daifuku, the Komatsu Fork Lift Co., Hitachi, and Mitsubishi. German firms with agencies in Australia include Kraup K.G., Telelift GmbH & Co., and Saxlun A/S Soltau. France is represented by Leroy-Somer.

Australia imports electric forklift trucks primarily from the United Kingdom and Germany, while Japan and the United Kingdom supply combustion-engine models. Japan also sells power-operated cranes, for mounting as mobile cranes, and power-operated hoists and winches.

A preferential tariff rate is applied to imports from the United Kingdom and Ireland, and, with some exception, to imports from Canada, New Zealand, and Papua. Britain's entry into the Common Market will probably bring an end to preferential tariffs on U.K. goods. Under the New Zealand/Australia Free Trade Agreement, tariffs on many New Zealand goods have been entirely removed or progressively reduced.

As of July 1, 1972, general tariff rates on materials handling equipment and systems ranged from 7½% for chain hoists and chain pulley tackle to a maximum of 55% for conveyors and transporters and their parts. The Minister for Customs and Excise can authorize the importation of goods either free or at lowered duty rates where equivalent Australian goods are not available.

Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-232), U.S. Department of Commerce, Washington, D.C. 20230.

The Australian Tariff Board is studying protective duties for materials handling equipment; its recommendations were to have been made public and ratified by the Federal Parliament by the end of 1973. Any significant lowering of the duty would probably lead to a reduction in domestic production and an increase in imports; the principal items to be affected include hoists and straddle, platform, and forklift powered trucks.

A National Materials Handling Bureau is maintained by the Bureau of Transport Economics to assist industry and commerce in adopting improved and uniform handling techniques and distribution methods. The Commonwealth Department of Labour sponsors the Productivity Promotion Council of Australia to educate and familiarize businessmen with the various elements of productivity.

Import goods valued at less than $100,000 generally are financed by banks through either a letter of credit or the overdraft line of credit established by the client. Current overdraft rates are 7¼%; the credit period depends on the value, type, and use of the imported equipment and on the financial status and character of the importer. Imports of $100,000 and over are usually financed through intercompany arrangements between the overseas parent and the local subsidiary.

End-users have shown increasing interest in leasing materials handling equipment, particularly industrial trucks, cranes, and loaders. Major manufacturers, such as Clark and Caterpillar, have their own lease plans, while others use the leasing arrangements of banks and finance companies.

Warranties vary considerably, depending on the type of materials handling equipment and the supplier. For example, conventional conveyor systems usually have warranties good for 3 months after installation, while 6-month warranties are given for

Table 3.—U.S. exports to Australia of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	—	—	1	—
Parts for above	17	59	55	36
Other cranes, unmounted	102	305	70	553
Other crane parts	975	892	687	299
Subtotal, cranes and parts	1,094	1,256	812	888
Hoists	204	171	154	135
Parts for hoists	31	53	26	49
Derricks	—	3	—	—
Winches	719	199	171	145
Parts for above, etc.	5,135	5,740	4,590	3,377
Hydraulic jacks, parts	72	93	147	65
Other jacks and parts	57	34	33	43
Other lifting equipment	103	79	138	387
Subtotal, lifting equipment	6,321	6,372	5,259	4,201
Elevators, escalators	12	—	37	—
Parts for above	136	219	215	156
Gravity conveyors	88	—	—	—
Overhead conveyors	—	—	—	64
Pneumatic conveyors	66	20	16	—
Wheeled conveyors	—	13	—	—
Other conveyors	154	749	120	158
Parts for conveyors	370	270	441	199
Subtotal, conveyors and parts	826	1,271	829	577
Used and rebuilt tractor shovel loaders (TSL)	96	17	—	—
Front-end loaders for mounting on TSL	390	186	58	46
Subtotal, loaders and used TSL	486	303	58	46
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel dr., all	145	458	428	375
4-wheel dr., -1	201	351	333	197
4-wheel dr., 1-1.49	140	585	299	163
4-wheel dr., 1.5-1.99	354	1,252	491	190
4-wheel dr., 2-2.49	235	552	498	75
4-wheel dr., 2.5-3.49	640	894	982	312
4-wheel dr., over 3.5	6,682	6,936	5,456	1,304
Subtotal, wheeled TSL	8,397	11,028	8,487	2,616
Total, lifting, loading, and conveying equipment	17,124	20,230	15,445	8,328
Industrial vehicles (IV)				
Walking and powered IV	270	142	198	263
Electric-powered IV	—	74	63	68
Gasoline-powered IV	431	601	227	81
Other-powered IV	639	741	221	171
Portable stackers	—	65	—	—
Parts for above	4,421	6,053	5,049	3,943
Total, industrial vehicles	5,761	7,676	5,758	4,526
Total, materials handling equipment	22,885	27,906	21,203	12,854
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng. hp	269	143	167	36
45-59.9 eng. hp	—	—	—	22
60-89.9 eng. hp	372	341	301	402
Over 89.9 eng. hp	329	413	668	940
Subtotal, tracklaying TSL	970	897	1,136	1,400
Underground loaders	57	166	39	44
Parts for above	224	125	209	72
Oil field rod-lift equipment	319	86	296	156
Oil field derrick, parts	37	67	44	—

Table 3.—U.S. exports to Australia of materials handling equipment, 1969-72—Continued
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Other oil field lift equipment	632	40	117	59
Farm elvators	—	—	—	—
Parts for farm elevators	—	2	—	—
Automobile lifts	—	—	4	—
Underground mine conveyors	—	—	—	—
Subtotal, other equipment	1,269	486	709	331
Total, tracklaying and other equipment	2,239	1,383	1,845	1,731
Grand total, mechanical handling equipment	25,124	29,289	23,048	14,585

Source: *Exports, Commodity by Country,* FT-410—1969, 1970, 1971, and 1972, U.S. Department of Commerce, Bureau of the Census.

complex systems. Service contracts are often written in conjunction with warranties, particularly in the field of elevators and conveyors.

Many large materials handling equipment manufacturers in Australia train technicians and service personnel, and Australian technical colleges are graduating a growing number of specialists. Technical support for sales and service is satisfactory for most traditional applications, but there is a continuing shortage of trained personnel in advanced conveyor technology and electronics.

Several techniques for improving export sales of advanced materials handling equipment to Australia have been suggested by importers and users. The U.S. supplier must educate the potential end-user to the advantages of sophisticated equipment and systems. The Australian Government conducts several programs that demonstrate the availability and performance of modern equipment, but end-users still refrain from investing in improved technology because of the high initial cost.

To aid market penetration and customer relationships, suppliers should promote the cost benefits of their products to local management. Customer-supplier relationships can be further enhanced by ensuring that the major cities of Sydney, Melbourne, Perth, and Brisbane are served when new distributorships are established.

Companies promoting materials handling equipment and systems should acquaint leading engineers with their latest products since industrial engineers are increasingly engaged to design factories. The Australian process machinery manufacturer also has considerable influence on the type of materials handling system installed in new factories and often acts as subcontractor. Leading companies in the supply and installation of process machinery include Austin-Anderson, Mauri Brothers & Thomson, and Bell Bryant.

Technical Requirements

Production and safety codes, issued by the Standards Association of Australia, are enforced by the Departments of Labour and Industry in each State. Safety laws generally are more stringent than those in the United States, and suppliers are advised to check the appropriate regulations, including those pertaining to electrical wiring. Suppliers of internal combustion vehicles should also check the pollution control laws.

Information may be obtained from the Standards Association of Australia, Standards House, 80 Arthur St., North Sydney, N.S.W. 2060; and the Department of Labour and Industry, 132 George St., Sydney, N.S.W. 2000. Detailed information on technical requirements may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

Electricity generally is supplied at 240/415 volts, 50 hertz; 1 or 3 phases, 2,3, and 4 wires. Manufactured gas generated from coal is used in all States except Victoria, which has converted to natural gas. New South Wales is expected to convert to natural gas in 1974.

The metric system is widely used in Australia and will be standard by 1980; the Imperial System of Weights and Measures is still acceptable, however. Specific labeling requirements do not exist in Australia.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

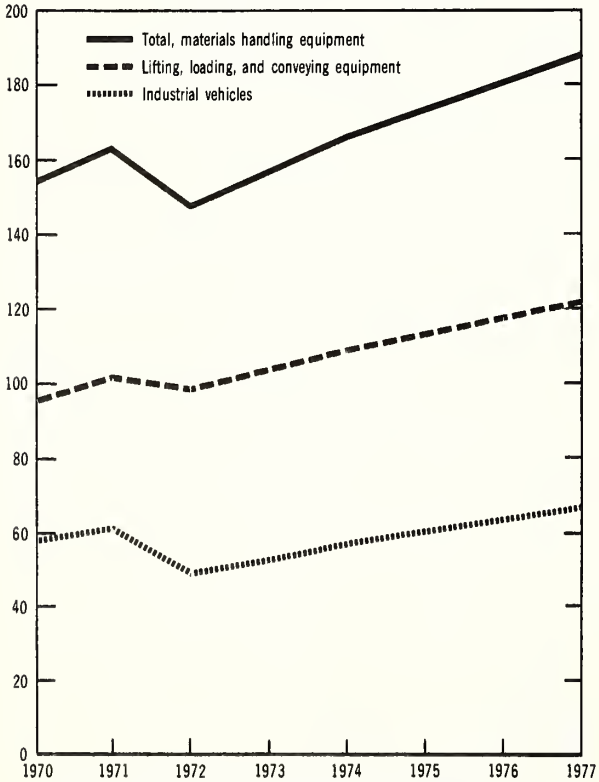
"The Market for Materials Handling Equipment and Systems in Australia," DIB 73-12-508, March 1973.

Belgium

The modernization and expansion of Belgium's industrial plants is expected to propel the country's market for materials handling equipment and systems (MHE&S) from $148 million in 1972 (see table 1) to $188 million in 1977, representing an annual average growth rate of 5%.

Belgium: Size of market for materials handling equipment, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by Office of International Marketing, U.S. Department of Commerce, official Belgian statistics, and trade estimates.

Increased productivity and the elimination of waste and inefficiency rank high in industrial and business investment objectives in this small but highly industrialized country. Belgian manufacturers consequently will allocate a large portion of their investment capital to materials handling equipment and systems. The performance capability and advanced technology of U.S.-origin products make the market for MHE&S a promising one for American manufacturers.

Lifting, loading, and conveying equipment accounted for about two-thirds of Belgian expenditures for materials handling equipment in 1972. Sales of such equipment totaled $98.7 million in that year and are predicted to reach $121 million in 1977, an increase of 23%. Sales of industrial vehicles should increase 36% during the same period, rising from an estimated $49 million in 1972 to almost $67 million in 1977.

Imports of materials handling equipment were valued at $119.3 million in 1972, up 29% over 1970 imports of $92.8 million. An increase of 26% in the imports of MHE&S is expected during the 1973-77 period, with the value of imported equipment approaching $151 million in 1977.

Imports of lifting, loading, and conveying equipment are anticipated to grow 28% during the same period, with the value increasing from an estimated $93.3 million in 1972 to almost $120 million in 1977. Imports of industrial vehicles, valued at $26 million in 1972, are expected to reach $31.3 million in 1977, an increase of 20%.

U.S. firms have long been among the leading exporters of materials handling equipment to Belgium. Although increasing at a slower rate than Belgium's

Table 1.—Belgium: Size of market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	68.8	60.6	58.5
Imports	62.8	85.7	93.3
Exports	35.9	44.8	53.1
Market size[2]	95.7	101.5	98.7
Industrial vehicles			
Production	48.1	48.5	45.6
Imports	30.0	33.3	26.0
Exports	19.5	20.8	22.7
Market size	58.6	61.0	48.9
Totals, materials handling equipment			
Production	116.9	109.1	104.1
Imports	92.8	119.0	119.3
Exports	55.4	65.6	75.8
Market size	154.3	162.5	147.6

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[1] Bureau of International Commerce estimates based on market research.
[2] Market size equals production plus imports minus exports.

Source: Production values based on data of Federation des Enterprises de l'Industrie des Fabrication Metalliques—FABRIMETAL. Foreign trade values based on data of l'Institut National de Statistique.

total imports during recent years, imports of materials handling equipment from the United States are expected to expand rapidly through 1977, benefitting from the devaluation of the dollar and from the higher inflation rate in Belgium. Dollar devaluation should have a greater impact in Belgium than in other European countries because of the strong market presence of U.S. companies.

U.S. firms sold $39.3 million of mechanical handling equipment to Belgium in 1971, for a 29.4% share of the import market (see table 2). Germany held a 32.9% share of the Belgian import market for this product category with sales of $44 million in that same year. Other important suppliers in 1971 were France with 14% of the import market, the Netherlands with 7.3%, and the United Kingdom with 4%.

Specific Sales Opportunities

Favorable sales opportunities for American manufacturers of the following products were identified by a market research study conducted recently in Belgium for the U.S. Department of Commerce.

Lifting, Loading, and Conveying Equipment
- Mobile hydraulic, telescopic cranes
- Mobile mechanical cranes
- Conveying equipment and parts
- Hydraulic motors and actuators
- Container cranes
- Special-purpose hoists and parts

Industrial Vehicles
- Front-loading forklift trucks, electric, gasoline, and diesel powered
- Side-loading forklift trucks
- Forklift truck attachments
- Tow tractors

Systems and Specialized Equipment
- Automated conveying, storage, and commissioning systems and components
- Electronic loading control systems
- Palletizing and depalletizing equipment
- High-bay warehouse equipment

Lifting, loading, and conveying equipment.—American manufacturers hold a strong position in the Belgian market for cranes because of the acknowledged technological superiority of U.S.-made products. U.S. features preferred by Belgium purchasers include simplicity of operation, ease of maintenance, reliability, stronger alloys, and less deadweight.

Mobile hydraulic, telescopic cranes, particularly those with capacities between 15 and 30 tons, are needed in port areas to handle bulk traffic. The latent market for hydraulic cranes with capacities of over 40 tons could become active if such equipment were streamlined and additional safety features were incorporated in their design. U.S. manufacturers can expect an upswing in Belgian demand for mobile mechanical cranes, particularly for heavyweight crawler-type cranes, truck cranes, and container cranes.

The recognized need of Belgian manufacturers to reduce labor costs and accelerate production is stimulating the market for conveying equipment, in which U.S. manufacturers and their Belgium subsidiaries already have a significant share. Increased use of conveyors has, in turn, spurred demand for U.S. conveyor parts both as original equipment and as replacements.

Requirements are especially acute for the following items: heavy-duty steel cables and special alloy chains for use in overhead power conveyors and in free and underfloor conveyors; rails used in overhead conveyors; electronic sensors and relay switches; heat-resistant pusher bars; and belts made of rubber and teflon-covered fibers. Another factor which has created excellent sales prospects for U.S. manufacturers is the lead they have in equipment designed for specialized applications.

Industry use of hydraulic actuators for continuous conveyors and other special equipment is steadily increasing. Belgian purchasers find that U.S. industry is far ahead of other countries in hydraulic techniques, giving American firms an advantage in this growing market segment. Sales opportunities will increase for truck cranes and for special-purpose hoists and parts.

Industrial vehicles.—The Belgian market for industrial vehicles is expected to grow by 36% during the 1973-77 period. Heavier capacity trucks are needed for container handling and for transporting heavy industrial parts, and Belgian users are purchasing lift trucks with capacities of 5 to 50 tons.

The reputation of U.S.-made heavy-duty forklift trucks for superior construction, simplicity of operation, stability, flexibility, and durability should enable American manufacturers to realize continued strong sales of these items.

Systems and specialized equipment.—American industry has established an excellent position in this segment of the MHE&S market and currently leads in sales of automated computer-controlled conveyor systems, photoelectric coding/decoding equipment, and commissioning equipment. U.S. firms are expected to retain this lead. Sales of high-bay warehouse equipment and automated trains are also expected to grow.

Engineering firms specializing in solving materials handling and storage problems and manufacturers of automated materials handling and warehousing systems are prime targets for the sales of such automated system components as minicomputers, sensors, light barriers, relaps, and electronic coding/decoding equipment. Components are also being imported increasingly into Belgium for re-export.

Belgium offers a promising market for improved palletizing/depalletizing equipment and for electronic loading-control systems that eliminate the danger of overloading heavy hydraulic, telescopic, and mechanical mobile cranes.

Belgian trade representatives indicate that many potential users of systems and specialized equipment are presently unaware of the performance capabilities and cost advantages of such equipment. U.S. suppliers must increase their efforts to present potential customers and materials handling engineers with detailed information concerning products and systems.

End-User Analysis

Belgian industrial firms are expected to increase their purchases of conventional equipment and move toward greater utilization of specialized equipment and systems during the next few years. The major Belgian materials handling equipment end-users during the 1972-77 period are expected to be the metalworking, chemical, woodworking, canned foods, and ocean transportation sectors

Metalworking industry.—Belgian investment and growth statistics of the metalworking industry combine several diverse industrial sectors not generally considered as a group, including steel and steel products, consumer durable goods, plastic products, various types of machinery, and transportation equipment.

Capital investment of the country's 2,700 metalworking firms in 1972 was an estimated $200 million. Expenditures for materials handling equipment in 1972 represented 8% of total investments, or $16 million. An estimated 4% average annual increase in investments is forecast between 1972 and 1975, with MHE&S expenditures expected to average 10% per year.

Heavy machinery purchases are expected to include mobile and truck cranes and forklift trucks, with heavy diesel forklifts of 2 1/2- to 5-ton ca-

Table 2.—Exports of mechanical handling equipment to Belgium by principal suppliers, 1969-71 [1]
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	34.8	37.8	54.0	42.1	39.3	29.4
Germany	26.1	28.4	32.5	25.4	44.0	32.9
France	10.5	11.4	17.2	13.4	18.8	14.1
Netherlands	7.3	7.9	8.1	6.3	9.7	7.3
United Kingdom	3.6	3.9	4.7	3.7	5.4	4.0
Others	9.7	10.6	11.7	9.1	16.5	12.3
Total	92.0	100.0	128.2	100.0	133.7	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume 111, 1969, 1970, and 1971, published by OECD, based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

pacity in special demand. Automatic storage and remote-controlled train systems will be used increasingly in plants manufacturing a broad range of products, while the use of integrated conveyor systems of all types should grow among firms manufacturing durable consumer goods.

One of Belgium's largest industrial enterprises, the 200-year-old Cockerill-Ougree-Providence, S.A., based in Seraing, produces about 40% of the country's steel. Its 37,000 employees work in two plants near Liege and at the Engineering Division in Seraing.

Cockerill's Liege facilities process flat iron and steel products, coated products, semiproducts, rolling stock, welded pipes, forgings, and spheroidal cast iron. The Engineering Division manufactures diesel engines and locomotives, steam and gas turbines, and nuclear equipment.

Over $13 million of Cockerill's total 1971 investment of $67 million represented purchases of materials handling equipment. Planned modernization and expansion programs call for the expenditure of $143 million during the 1972-75 period, with over $28 million earmarked for materials handling equipment and systems. Cockerill's anticipated MHE&S purchases include computer-controlled conveying and storage systems, overhead traveling cranes, mobile cranes, and heavy lift trucks.

Cockerill's 75-mile rail system utilizes 80 locomotives and 1,200 freight cars. The company has 200 diesel forklift trucks, with capacities of up to 25 tons, and 30 heavy side-loading coil carriers. Its belt conveyors and chain belt conveyors extend 160,000 feet, while 1,000 feet of power and free conveyors are used to transport wire coils.

Conveyor control is handled by relays and other conventional electronic equipment. Lifting equipment includes 300 overhead traveling cranes with capacities of up to 350 tons, 3 heavy gantry cranes, 6 harbor cranes, and many mobile cranes and die handlers.

Chemical industry.—Belgium's chemical industry in 1970 included 238 firms with a total work force of 44,100. Twelve of the firms employed more than 500 persons each. Sales of chemical products totaled $1.1 billion in 1970, and production is expected to increase at an average annual rate of 8% from 1972 through 1975.

Investments by the chemical industry amounted to $191 million in 1970 and are forecast to expand at an average rate of 10% a year through 1977. About 2% of total investments are expected to be allocated for purchases of materials handling equipment and systems.

The greatest materials handling needs in the chemical industry are for belt conveyor systems; standard diesel and special explosion-protected forklift trucks; attachments for forklift trucks; and high-bay warehouses equipped with rack stackers, palletizers/depalletizers, and controls.

UCB, S.A., Brussels, is one of Belgium's largest chemical enterprises and the country's leading manufacturer of plastic foils. It employs more than 5,000 persons in plants throughout the country. The firm's sales in 1971 reached $170 million.

UCB's Sidac Division plant in Ghent, which specializes in the production of cellophane, had sales of about $51 million in 1971. The Sidac Division estimates its current investment in materials handling equipment and storage facilities at $2.2 million. Equipment includes 10 continuous belt conveyors, 8 electric hand-elevating trucks, and 15 electric and 9 gasoline forklift trucks. The Division has 7 ground-floor warehouses and one 3-aisle high-bay warehouse that includes 3 pushbutton-operated rack stackers.

As part of an expansion project designed to increase its production capacity by 50%, Division Sidac plans to spend about $180,000 per year during the next 3 to 5 years for forklift trucks and conveyors and for the construction of additional automated storage facilities.

UCB's Chemical Specialties Division in Drogenbos manufactures a variety of chemical products. Total sales in 1971 exceeded $13 million. The Division's current materials handling equipment includes 5 pneumatic conveyor systems, one belt conveyor, 8 gasoline-powered and 5 electric forklift trucks with capacities of 1 to 2 tons, one 5-ton-capacity forklift truck and one hydraulic rack stacker. The Division's future plans include the installation of continuous conveying systems.

Woodworking industry.—Belgium's woodworking industry comprises more than 1,200 firms, of which 1,080 are furniture manufacturers and 120 are sawmills. Some 38,000 persons are employed by the furniture producers sector and 4,000 by the sawmills. Sales of the woodworking industry exceeded $580 million in 1970, $480 million of which was accounted for by furniture manufacturers and $100 million by sawmills.

Industrial lifting platforms, overhead traveling cranes, conveyor systems of all types, and forklift trucks are the main materials handling equipment used by the woodworking sector. Capital investments by the sector in 1970 amounted to $19.5 million, with 9% allocated to purchases of MHE&S.

Woodworking firms are expected to increase their investments 14% annually during the period 1972-75, with 10% ($2.7 million) allotted for materials handling equipment. Purchases of forklift trucks and elevating platforms should represent a significant portion of these expenditures.

Van Pelt, N.V. Antwerp, a manufacturer of modern furniture, had sales of about $23 million in 1972 and employed 950 persons. The company expects an annual growth rate of 15-20% during the next five years, and plans to double its production capacity within 10 years.

Van Pelt attributes its recently increased productivity in part to improved materials handling techniques and plans to spend $800,000 on this type of equipment during the next 10 years. Purchases will include semiautomatic conveying systems and larger and faster forklift trucks. Van Pelt presently uses 8 forklift trucks, 10 hoists, 2 elevators, and several roller conveyors. Its pallet and ground floor storage facilities are controlled by punch cards.

De Coene and Company, N.V., Courtrac, operates the largest sawmill in the industry. The most important of the four De Coene plants, located in Koestrek, employed 1,200 persons in 1972 and had sales of $25 million. This company anticipates an average increase of 10% per year in sales.

De Coene's materials handling equipment includes 3 belt conveyors; one gasoline, one electric, and 5 diesel forklift trucks; one side-loading forklift truck; 6 electric elevating trucks; 15 lifting platforms; one railroad gantry crane 2 overhead traveling cranes with 7 1/2- and 10- ton capacities; one 10-ton gantry crane; one 4-ton railroad elevating platform; and 2 automatic pneumatic conveyors. The firm also has constructed its own vacuum attachments for use with the cranes. Its pallet storage system is manually controlled.

Canned foods industry.—The canned foods industry, comprising 50 firms employing 5,000 persons, represents one of the most advanced industrial sectors in Belgium in terms of its MHE&S usage. Sales in the industry in 1970 exceeded $60 million and investments totaled $3.7 million. This sector generally allots a large percentage of its investment capital to materials handling equipment, with purchases recently averaging about $500,000 per year.

Rising storage costs have increased the need for automated warehousing equipment among large- and medium-size firms, and sales of such equipment are expected to grow substantially in the 1973-77 period. The use of U.S.-origin food processing machinery by Belgian firms should give U.S. MHE&S manufacturers a definite advantage in selling advanced equipment.

Other types of equipment widely used in this sector are forklift trucks, rack stackers, palletizers/depalletizers, and belt, bucket, cable, and magnetic conveyors. Industry plans call for continued purchases of forklift trucks and conveying systems, with demand seen increasing for electronic controls, including coding/decoding equipment, and for improved palletizers/depalletizers incorporating vacuum-lifting attachments for coupling with stacking cranes and lift trucks.

One of the largest manufacturers of canned foods in Europe is Belgium's S.A. Conserves Marie Thumas, N.V., based in Wilsale. This firm's seasonal employment ranges from 1,000 to 1,750 persons at three plants. Two of the plants manufacture tin cans to meet the company's requirements for 175 million cans per year; an additional 185 million cans are produced at these plants each year for sale to other firms in the industry. About 95% of the company's food products are grown on company-owned land.

Conserves Marie Thumas has contracted with a U.S. engineering firm for the design of a fully automated commissioning system. The firm plans expenditures of over $1.3 million during the next 4 years for materials handling equipment, with 10% of this amount designated for MHE&S equipment to be used in the manufacture of cans, 10% for food canning equipment, and 25% for storage, labeling, and casing equipment.

The current materials handling inventory of this company includes 45 forklift trucks, 15 electro carriers, 40 bucket elevators, 50 magnetic elevators and hydraulic and vibrating conveyors, 12 depalletizers, 27 palletizers, 7 palletizers/depalletizers, and several cable conveyors.

Ocean transportation.—Belgium's port of Antwerp, one of the world's largest, services 19,000 ships and 50,000 railroad trains annually; it handles 78 million tons of maritime cargo a year. About 80,000 persons are directly engaged in the activities of the port, which covers an area of over 24,000 acres, including 20 million square feet of covered storage space.

Firms connected with ocean transportation form one of the most important sectors of Belgium's economy in terms of sales and investments. Between 1960 and 1970, over $2.2 billion was spent to improve the Antwerp Port facilities .The Port Authority (the City of Antwerp) supplied $200 million and industry contributed $2 billion. Further port improvements anticipated to cost $200 million are planned.

Total investments in the ocean transportation sector approached $160 million in 1972. An annual average increase of up to 13% in investments is anticipated between 1972 and 1975, with the materials handling share climbing as high as 17% of total investments. Expenditures for MHE&S are forecast at $2.6 million in 1974 and $3.4 million in 1975.

The City of Antwerp owns the entire port area and operates most of the port equipment, including municipal quay cranes and privately owned mobile cranes. Cargo handling and the loading and unloading of seagoing vessels and barges are the responsibilities of private enterprises.

Lifting equipment in the port consists of 545 harbor cranes, 44 floating cranes and derricks, 192 mobile cranes, 14 loading bridges, 6 gantry cranes, 22 pneumatic grain conveyors, 4 sack loaders and 2 bucket wheel loaders, and about 1,800 forklift trucks.

The Port Authority has not purchased equipment for the operation of the port since 1968; all equipment is now bought or leased by private companies. However, the Port Authority does own 269 electric cranes and 49 hydraulic mobile cranes that were purchased before 1968, and it rents these to private companies. Many of the Authority's cranes are fast becoming obsolete. Thus, the private firms that will purchase the replacement cranes represent a substantial portion of this sector's potential materials handling equipment customers.

In addition to furnishing a good market for harbor cranes, the ocean transportation sector generates a steady demand for large conveyors, conveyor parts, tow tractors, lifting chains and hooks, and mobile cranes, including straddle carriers for conveyors.

An increase in requirements for forklift trucks, especially for heavier standard diesel trucks of up to 5-ton capacity and for very heavy trucks with up to 50-ton capacity, may also be anticipated. Such trucks will be needed to handle greater container traffic and to increase the flexibility of forwarders in handling heavy goods.

The increase in the number of private industries establishing plants in the port area is a strong influence on the predicted steady demand for MHE&S in this sector. The chemical firm Bayer Chemie, S.A., located in Antwerp, has committed $136 million for the construction of three chemical plants near the port area. These are scheduled for completion in 1973. MHE&S purchases by this company will be concentrated on conveyors, palletizers/depalletizers, and automated storage facilities.

Degussa-Antwerp, N.V. expects to complete construction in 1974 of a new chemical plant costing $13 million. Planned purchases of materials handling equipment include conveyors of all types and about 10 forklift trucks. Beliard Murdoch, S.A., plans to complete a wet dock in 1973 as part of a $22-million construction project.

A drydock is also scheduled to be completed very soon as part of the $22-million construction project of Mercantile Marine Engineering and Graving Docks CY, N.V. Both of these firms will require hoists, conventional cranes, mobile cranes, forklift trucks, lifting platforms, electric tractors, and possibly small parts for automated storage facilities.

Competitive Environment

There are approximately 100 leading Belgium manufacturers of materials handling equipment. Forty-one of these companies manufacture lifting and hoisting equipment, 47 manufacture conveyors and conveying systems, and 9 produce industrial vehicles.

The output of domestic materials handling equipment manufacturers increased 120% between 1968 and 1971. A more modest, but still sizable, production increase of 45% is forecast during the 1972-77 period. A significant proportion of Belgium's domestically produced equipment is exported.

All major industrial countries are represented in the Belgian MHE&S import market, but no single foreign country dominates the market. U.S. firms are the only foreign manufacturers producing materials handling equipment in Belgium, but the products of other countries, especially of Germany, France, the Netherlands, and the United Kingdom, are well represented through sales and service organizations.

In the area of lifting, loading, and conveying equipment, Germany is represented by Fromme Forderanlagen (conveyor systems), Hermann Genkinger electric hoists), Konig Baumaschinenvertrieb (cranes), Hermann Lanz (loaders), Weserhutte Otto Wolf (cranes), H. Weyhausen Demag AG (mobile cranes), and Wolf & Co. (cranes). French manufacturers selling in Belgium include ACEBI (cranes), Letourneau (mobile cranes), LOC (electric hoists), Ets Jean Oudin (elevating platforms), Piquard (conveyors), Poclain (mobile cranes), and Tichauer & Cie (cranes).

Representing the United Kingdom are The British Hoist & Crane Co. (cranes and hoists), Hagglund Rosson (foundry conveyors), Translift Engineering Co. (lifting platforms), and Whitlock Bros., Ltd. (cranes). Elevators by SPA Ormic of Italy, lifting equipment of HEK of the Netherlands and of Takto Werke of Sweden, and hydraulic cranes of Sesam of Norway are also marketed in Belgium.

Companies selling industrial vehicles in Belgium include: Jungheinrich, Junkerater Maschinebau, MIAG, Orenstein & Koppel, SE Fahrzeugwerke, Steinbock, and Ernst Wagner (Germany); Blereaz-Peg, Fenwick Manutention, and PRAT (France); Battioni & Pagani, Berzoini, Fassi Giacomo & Figlio, Fiat, Longhini, and Valla (Italy); Hinomoto, Komatsu, T.C.M., and Toyota (Japan); Balcancar (Bulgaria); Machinoexport (U.S.S.R.); and Conventry Climax, Lancer Boss, Mercury Truck & Tractor Co., Rollalong, Ltd., and Rubbery Owens (United Kingdom).

Although the United States meets with formidable competition in the Belgian MHE&S market, American manufacturers have established a strong marketing position. As discussed elsewhere in this Survey, end-user demand is now starting an upward trend that is likely to continue for several years.

Official statistics of the U.S. Bureau of Census annual publication, *Exports, Commodity by Country,* FT 410, show in detail U.S. exports of materials handling equipment to Belgium in selected years (see table 3).

Table 3.—U.S. exports to Belgium of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	—	—	1	15
Parts for above	67	60	91	35
Other cranes, unmounted	512	1,689	1,985	101
Other crane parts	282	1,072	1,858	259
Subtotal, cranes and parts	861	2,821	3,935	410
Hoists	346	501	54	35
Parts for hoists	177	106	89	53
Derricks	16	—	—	28
Winches	411	81	14	16
Parts for above, etc.	23,025	32,620	23,018	25,113
Hydraulic jacks, parts	45	30	36	24
Other jacks and parts	32	19	48	19
Other lifting equipment	50	273	181	320
Subtotal, lifting equipment	24,102	33,630	23,440	25,608
Elevators, escalators	9	6	15	55
Parts for above	162	320	257	311
Gravity conveyors	3	50	116	—
Overhead conveyors	—	—	—	—
Pneumatic conveyors	—	9	120	—
Wheeled conveyors	—	—	—	—
Other conveyors	311	129	188	133
Parts for conveyors	294	185	417	330
Subtotal, conveyors and parts	779	699	1,113	829
Used and rebuilt tractor shovel loaders (TSL)	—	1	—	55
Front-end loaders for mounting on TSL	297	—	17	144
Subtotal, loaders and used TSL	297	1	17	199
Tractor shovel loaders (TSL, with bucket size in cu. yds.)				
2-wheel drive, all	108	59	18	22
2-wheel drive, -1	—	81	24	25
4-wheel drive, 1-1.49	24	49	—	—
4-wheel drive, 1.5-1.99	159	35	138	—
4-wheel drive, 2-2.49	24	—	—	87
4-wheel drive, 2.5-3.49	7	—	—	82
4-wheel drive, over 3.5	1,232	1,383	1,293	1,174
Subtotal, wheeled TSL	1,554	1,607	1,473	1,390
Total, lifting, loading, and conveying equipment	27,593	38,758	29,978	28,436
Industrial vehicles (IV)				
Walking and powered IV	70	55	56	74
Electric-powered IV	73	35	29	86
Gasoline-powered IV	718	1,171	361	285
Other-powered IV	213	436	243	144
Portable stackers	6	3	38	—
Parts for above	5,511	13,142	8,258	4,442
Total, industrial vehicles	6,591	14,842	8,985	5,031
Total, materials handling equipment	34,184	53,600	38,963	33,467
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng. H.P.	5	7	—	—
45-59.9 eng. H.P.	—	—	—	—
60-89.9 eng. H.P.	69	59	31	—
Over 89.9 eng. H.P.	499	337	258	1,365
Subtotal, tracklaying TSL	573	403	289	1,365
Underground loaders	—	—	—	—
Parts for above	1	—	—	—
Oil field rod-lift equipment	2	—	—	—
Oil field derrick, parts	3	—	—	15
Other oil field lift equipment	—	1	—	15
Farm elevators	—	3	18	—
Parts for farm elevators	—	—	—	—
Automotive lifts	5	—	—	—
Underground mine conveyors	—	—	—	—
Subtotal, other equipment	11	4	18	30
Total, tracklaying and other equipment	584	407	307	1,395
Grand total, mechanical handling equipment	34,768	54,007	39,270	34,862

European manufacturers face higher inflation rates than do American producers. Realignment of major international currencies has also helped to make U.S. products, in terms of landed costs, especially attractive to Belgian industrialists. Finally, Belgian buyers are generally cognizant of advanced U.S. technology, which will often solve their operational problems.

Especially important to firms considering marketing in Europe for the first time is the fact that Belgium is ideally suited for market testing, for product modification, and for the development of sufficient knowledge of European business conditions to facilitate expansion into other parts of Europe. Thus, a combination of market factors make the present time unusually favorable for U.S. manufacturers to become established in Belgium or to increase their market participation there.

Imports of materials handling equipment from the United States are subject to customs duties ranging from 4 to 9% on lifting, loading, and conveying equipment and from 5 to 9.5% on industrial vehicles. Full customs duty rates are levied on leased equipment. Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-224), U.S. Department of Commerce, Washington, D.C. 20230.

For large purchases, the conditions of payment are a part of contract negotiations. Standard sales agreements provide for a 30% down payment with order, a 30% payment upon delivery, and the balance payable within 60 to 90 days after delivery. Standard equipment is generally sold on the basis of list price less a discount ranging from 5 to 15%. For cash payment, an additional 3% discount is offered; a 2% discount is given when full payment is made within 2 weeks of delivery. For deliveries of heavy equipment, a delivery period of from 4 to 7 months is considered normal.

About one-third of the industrial equipment used in Belgium is acquired via leasing. At the end of the usual 5-year leasing period, the equipment may be purchased through the payment of an amount equal to 5% of the total leasing costs.

Equipment warranties to consumers normally include a provision for maintenance and servicing.

While many makes and types of U.S. equipment are highly respected by Belgian and-users, such users do suggest that American materials handling equipment manufacturers could attract the attention of a far greater number of customers through the display of sales and technical literature, the showing of films portraying the equipment in operation, and the presentation of technical papers on the application of advanced technology to solve problems encountered in Belgium.

Of course, the appointment of a qualified sales and service representative is the vital first step to building profitable sales. In this regard, Belgians stress that foreign manufacturers should avoid the appointment of a firm which might encounter difficulties in relations with local provincial groups.

Technical Requirements

The sale of materials handling equipment and systems in Belgium is governed by the standards of the Federation Europeene de Manutention (European Federation of Materials Handling Equipment Manufacturers). The requirements of the Institut Belge de Normalisation (Belgian Standards Institute) and the Societe Belge des Mechaniciens (Belgian Engineering Society) serve as guidelines in the sale of such equipment.

Imported equipment must meet the safety standards set forth in the Reglement General pour la Protection du Travail (Industrial Safety Act). Safety laws are enforced by the Inspection Technique du Travail du Ministere de l'Emploi et du Travail, Rue Beillard 53, Brussels.

The Association des Industriels de Belgique AIB, Avenue Andre Drouart 29, Brussels, and the VINCOTTE Association, 1640 Rhode-Saint Genese, Brussels, inspect and approve industrial equipment. Although there are no labeling requirements for imported equipment, instructions for its use must comply with safety regulations.

The metric system of weights and measures is used in Belgium. Standard electric current is 220 volts, single-phase, 50 hertz. Detailed information on technical standards can be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

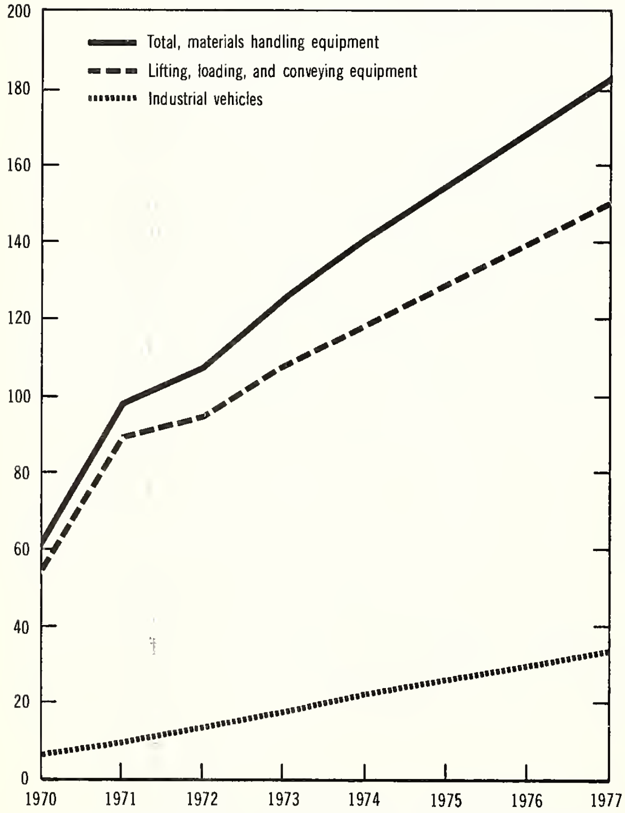
"The Market for Materials Handling Equipment and Systems in Belgium," DIB 73-12-511, April 1973.

Brazil

Brazil, with a robust economy expanding at better than 10% a year, provides a substantial market for materials handling equipment and systems (MHE&S). Major development projects such as the Ilha Solteira hydroelectric plant, the metropolitan railways system, the urban expressway expansion program, and the Transamazonia highway project helped spark a 75% rise in purchases of MHE&S during the 1970-72 period. Purchases rose from $61 million in 1970 to $108 million in 1972 (see table 1), an average increase of 33% annually.

Brazil: Size of market for materials handling equipment, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by U.S. Department of Commerce, Office of International Marketing, official Brazilian statistics, and trade estimates.

Continued expansion of the country's industrial base, coupled with increased automation and a high rate of capital formation, should push expenditures for materials handling equipment by 1977 to $183 million, or triple the market size at the start of the decade.

Lifting, loading, and conveying equipment in 1972 accounted for $94 million in sales, or 87% of the total market for materials handling equipment; this represented an increase of 70% over 1970 sales of $55 million. The market for this equipment is expected to reach $150 million in 1977. Purchases of industrial vehicles increased from $6.6 million in 1970 to $13 million in 1972 and are expected to total $33 million in 1977.

Wider interest in advanced materials handling systems is developing in Brazil. The country's major industries are expected to begin applying the latest materials handling technology within the next several years, and a significant market therefore could emerge during the late 1970's.

Imports continue to satisfy a large portion of the country's requirements for MHE&S. Imported equipment in 1972 accounted for an estimated $50 million, more than 45% of the total market. This reflected a 70% increase over the 1970 level of $29 million. MHE&S imports remain vital to Brazil despite the growing strength of the domestic industry; imports are projected to reach $67 million in 1977.

The United States was the largest foreign sup-

Table 1.—Size of market for materials handling equipment, 1970-72 [1]
(in millions of U.S. dollars)

	1970	1971	1972 [1]
Lifting, loading, and conveying equipment			
Production	27.4	36.5	48.3
Imports	27.8	52.9	46.8
Exports	.4	.6	.8
Market size [2]	54.8	88.8	94.3
Industrial vehicles			
Production	5.3	7.3	11.0
Imports	1.6	2.4	2.9
Exports	.3	.3	.6
Market size	6.6	9.4	13.3
Totals, materials handling equipment			
Production	32.7	43.8	59.3
Imports	29.4	55.3	49.7
Exports	.7	.9	1.4
Market size	61.4	98.2	107.6

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[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values based on preliminary statistics furnished by the Department of Statistics for Industry and Commerce of the Brazilian Institute of Geography and Statistics (IBGE/DEICOM). Foreign trade values based on data obtained from the Departmento da Carteira de Comercio e Exportacao, Banco do Brasil.

plier of *mechanical* handling equipment to Brazil in 1971, supplying 44% of the import market, or exports valued at $21.9 million (see table 2). The 1971 U.S. exports were about 65% higher than the 1969 level of $13.3 million.

Materials handling equipment exports from the United States totaled $19.8 million in 1971. MHE&S exports to Brazil by U.S. suppliers are projected to exceed $35 million in 1977.

The United Kingdom, with 1971 exports of *mechanical* handling equipment valued at $11.2 million (representing 22.6% of the Brazilian import market) is the United States' closest competitor. Germany's competitive position, along with those of France and Italy, improved during the 1969-71 period. Exports of *mechanical* handling equipment from Germany in 1971 totaled $6.5 million; from France, $4.5 million; and from Italy, $3.2 million.

Specific Sales Opportunities

A market research study recently conducted in Brazil for the U.S. Department of Commerce reveals favorable sales opportunities for American manufacturers of the following products:

Lifting, Loading, and Conveying Equipment

- Baggage-handling equipment
- Vacuum feed conveyors
- Accumulating conveyors
- Conveyors for bulk materials
- Stacker cranes
- Mobile and gantry cranes
- Straddle carriers

Industrial Vehicles

- Electrically powered forklift trucks
- Utility lift trucks
- Reach trucks
- Narrow-aisle trucks
- Side-loading trucks
- Forklift accessories

Systems and Specialized Equipment

- Order-picking systems
- Storage and retrieval systems
- Palletizing and depalletizing equipment
- Container handling equipment

Lifting, loading, and conveying equipment.—American suppliers of lifting, loading, and conveying equipment should continue to find a receptive market in Brazil, particularly for heavy equipment not manufactured locally and for a broad range of competitively priced equipment incorporating unique features. Brazil's demand for cranes and heavy-duty conveyors is increasing, and major purchasers will often seek foreign products because of design, performance, and financing considerations. Sales of mobile cranes are projected to exceed $15 million in 1973 and should reach $25 million by 1977. The Brazilian market for fixed cranes also shows good potential. Annual purchases are expected to exceed $9.6 million in 1977.

Sharp growth is foreseen for the country's stacker crane market, which is expected to climb from an estimated $250,000 in 1973 to $1.4 million in 1977. Sales of heavy-duty conveyors, one of the most popular items in the Brazilian MHE&S market, are projected to reach $20 million in 1973 and $30 million in 1977. Imported accumulating conveyors also are finding wide acceptance among the country's large industries. This market, although currently modest, is expected to reach $2 million in 1977.

Brazil's airports will need additional baggage-handling equipment, and American industry is the recognized leader in this field. Vacuum-feed conveyors are not manufactured in Brazil, and flour mills will remain dependent on imports to meet their growing needs for such equipment. Although the demand for high-rack stackers is presently limited, the market is expected to develop in the mid-1970's and to reach $400,000 in 1977.

Industrial vehicles.—While most of the demand for diesel- and gasoline-powered forklift trucks can be satisfied by local production, the market for electrically-powered forklift trucks is growing. The pharmaceutical and food industries, manufacturing under strict sanitary conditions, have a particularly strong need for electrically-powered forklift trucks for use in their laboratories, factories, and warehouses. Brazilian purchases of these trucks, projected at $1.2 million in 1973, are expected to exceed $2.2 million in 1977.

A market is also developing for pneumatic-tired forklifts for use in narrow-aisle warehouses. Sideloader and reach trucks, not produced locally, also will be imported to satisfy expanding requirements. Similarly, accessories for forklifts, such as paper-roll clamps or cotton-bale handlers, are in limited supply in Brazil, and a potential market for various accessories exists in the more sophisticated industries.

Systems and specialized equipment.—The market for advanced materials handling systems is likely to develop in Brazil toward the end of the decade. American exporters are expected to participate actively in the promising Brazilian market for advanced systems and specialized equipment.

Sales opportunities can be expected to emerge initially in the supermarket business, where efficiency in order-picking, storage, and retrieval systems currently is low. MAKRO, a wholesale supermarket recently established in Sao Paulo, has pioneered the application of relatively advanced materials handling systems. Other companies are considering similar operations.

Pallet sizes are not yet standardized in Brazil. When standardization occurs, a market for automatic and semiautomatic systems of palletizing and depalletizing could develop. Government-sponsored feasibility studies on the use of containers indicate a potential market for container handling equipment.

End-User Analysis

Brazil's diversified and rapidly growing industry has made this country a major market for materials handling equipment. Growing at an average rate of 10% a year, the country's gross national product (GNP) reached $50.6 billion in 1972. Industrial output grew by 64% during the 1962-70 period, and the climate for future expansion appears favorable. Brazil's increasing economic stability has stimulated investment in capital equipment and the application of more efficient production processes and systems.

The transportation equipment industry purchased MHE&S valued at $30 million in 1972, accounting for almost 30% of the total market. Other large purchasers include the chemical and fabricated metal products industries, each accounting for about 5% of Brazil's total MHE&S purchases in 1972. These industries, together with the food products industry, accounted for more than 60% of the production of Brazil's manufacturing sector in 1971.

In addition to the industrial sectors, large-scale development projects, often government-supported, present attractive sales opportunities to MHE&S suppliers. Bids on development projects receiving international support are usually accepted from both domestic and foreign suppliers and awards are based primarily on quality, performance, and price.

Many development plans lead to sizable imports of a broad range of materials handling equipment. A Japanese firm recently signed a cooperative agreement with the Brazilian company, Vale do Rio Doce, to develop a new process for cellulose produc-

Table 2.—Exports of mechanical handling equipment to Brazil by principal suppliers, 1969-71 [1]
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	13.3	54.7	22.9	56.3	21.9	44.2
United Kingdom	6.9	28.4	9.9	24.3	11.2	22.6
Germany	1.4	5.8	2.8	6.9	6.5	13.1
France	.4	1.6	1.3	3.2	4.5	9.1
Italy	.4	1.6	1.0	2.4	3.2	6.4
Others	1.9	7.9	2.8	6.9	2.3	4.6
Total	24.3	100.0	40.7	100.0	49.6	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by the Organization for Economic Cooperation and Development (OECD), based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

tion. The joint venture resulted in purchases of conveyors, shiploaders, and other port equipment valued at $9.5 million.

Transportation equipment industry.—The transportation equipment industry, composed of 685 automotive, tractor, and shipbuilding companies, is growing at 20 to 25% a year. This sector reported an 18% gain in capital investments in 1971.

The transportation equipment industry continues to be a major purchaser of materials handling equipment. Bridge cranes, bridge and pillar stackers, monorail and other heavy-duty transporters, and conveyors are used extensively. Most of the transport equipment companies continually review their MHE&S requirements and are expected to convert to semiautomated or completely automated systems by the end of the 1970's.

Sales opportunities for foreign suppliers may arise as a result of large-scale projects such as the modernization of shipyards or the refurbishing of the railroad system, undertaken by the Government separately or in cooperation with private industry. The transportation equipment sector has a continuing and substantial need for traditional equipment, such as overhead conveyor systems, bridge and stacker cranes, and forklift trucks.

Heavy conveyors are in great demand, with transportation equipment manufacturers expected to spend an estimated $6.1 million for such conveyors in 1973 and $9 million in 1977. The industry is beginning to use accumulating conveyors, and purchases are projected to reach $500,000 in 1977. Purchases of mobile cranes during 1973 should total $4.5 million and are anticipated to double by 1977, when sales of fixed cranes should peak at $1 million.

Chemicals and allied products.—The chemical and allied products industry also has been growing at a faster rate than the national industrial average, showing a cumulative growth of 92% in the 1962-70 period. The petrochemical and fertilizer industries are in a phase of rapid development. The chemical industry contributed 9.4% to the GNP and employed 103,950 people in 1970. It included 1,469 firms in 1969. This industry showed a 47% growth in capital investment in 1971.

The Brazilian chemical industry since its inception has provided a good market for materials handling equipment, accounting for about 15% of the country's MHE&S purchases of light- and medium-weight equipment in 1972. New projects, coupled with reequipment programs, should ensure a continuing demand for a broad range of increasingly sophisticated MHE&S. The pharmaceutical industry and others that must operate under laboratory conditions require electrically-operated industrial trucks that are not yet produced domestically.

Heavy conveyors and mobile cranes are particularly needed in the chemical industry. Purchases of heavy conveyors should total $3.6 million in 1973 and are expected to reach $6 million in 1977. The market for mobile cranes is increasing even faster and should double during the 1973-77 period, rising to a level of $4.5 million in the latter year. The industry's annual purchases of electric forklift trucks should total $600,000 in 1977, up from $300,000 in 1973.

With the anticipated growth and increasing sophistication of the Brazilian chemical sector, good markets for stacker cranes, accumulating conveyors, high-rack stackers, and other electric trucks should emerge by 1975. Yearly purchases of stacker cranes, accumulating conveyors, and high-rack stackers are all expected to double between 1975 and 1977, reaching levels of $200,000, $500,000, and $100,000, respectively.

Fabricated metal products.—Output of Brazil's fabricated metal products industry, composed mainly of small- and medium-size firms, grew 82% from 1962 to 1970. This was well above the country's overall industrial growth of 64%. The industry's real growth in terms of capital investment was 41% in 1971.

Purchases by the fabricated metal products sector currently account for about 10% of the total market for light- and medium-duty materials handling equipment and for 5% of the heavy-duty equipment. Many firms within the sector will be installing cranes, particularly bridge cranes, overhead monorail transporter systems, and stackers. In addition, forklifts and other monotorized equipment will be replaced with larger capacity equipment of the same type.

Heavy conveyors are frequently used in the fabricated metal products industry in Brazil. Purchases of this equipment totaled $1.2 million in 1972 and should reach $2 million by 1977. Mobile cranes also offer good sales opportunities, and 1973 purchases, estimated at $800,000, are projected to double by 1977.

The market for electric forklift trucks is growing, with 1977 purchases expected to reach $150,000, representing a 50% increase over the estimated 1973 level. Accumulation conveyor purchases are expected to total $400,000 by 1977.

Food and kindred products industry.—The food industry's contribution to Brazil's GNP in 1970 was $16.2 million, representing 9.3% of the total. Employing 13% of the country's industrial labor force in 1970, the sector consisted of 8,650 firms in 1969. During the 9-year period from 1962 to 1970, this industry grew 43%.

With the growing sophistication in processing and packaging methods, demand for a variety of materials handling equipment, is expected to develop. The market for imported electrically-powered forklift and platform-lift trucks is growing. Electric forklift trucks are now being used on a large scale, and purchases are expected to double to $400,000 by 1977. Purchases by food processors of heavy conveyors, used primarily in the sugar industry, were estimated at $2.4 million in 1973 and should reach $3.5 million by 1977. The market for accumulating conveyors should increase rapidly in the near future, and is projected to reach $500,000 in 1977.

Competitive Environment

The Brazilian materials handling equipment industry is currently geared to the manufacture of traditional, general-purpose machinery. Domestic production of MHE&S was estimated at $59.3 million in 1972, up 81% from the 1970 level of $32.7 million. Exports of MHE&S also rose during the same period, increasing from $700,000 in 1970 to an estimated $1.4 million in 1972.

Exports, consisting mostly of basic equipment shipped to the Latin American Free Trade Area (LAFTA), are expected to increase with the continued development of the domestic industry. Production of the Brazilian MHE&S industry should grow at an average annual rate of 15% during the 1972-77 period.

Domestic producers are capable of supplying most types of conveyors, a range of cranes, hoists, monorail systems and elevators, and gasoline- or diesel-powered forklift trucks. Importation of both advanced and standard materials handling equipment will continue.

Domestic production will be limited by the supply of steel, which often must be imported despite a well-established steel industry. Furthermore, foreign suppliers are often more competitive than domestic producers in terms of price and quality. In addition, Brazil will continue to purchase abroad substantial quantities of parts and heavy equipment that are not yet manufactured locally.

Many major Brazilian MHE&S manufacturers have licensing, royalty, or other agreements with foreign companies. The Brazilian Villares group, for example, manufacturers almost all their materials handling equipment under license from the Harnischfeger Corporation of the United States. The Villares group produces bridge cranes and stackers, monorail conveyors, and pneumatic handling equipment.

Other Brazilian heavy equipment producers affiliated with overseas suppliers are active in the manufacture of heavy cranes and conveyors. Important firms producing cranes are Cia Nacional de Guindastes, Torque S.A. Ind. e Com. de Maquinas Eletricas, and Vogg S.A. Industrias Metalurgicas.

Two major Brazilian conveyor manufacturers are Mecanica Jaragua S.A. and Mecanica Paulista S.A. Fabrica de Maquinas Famasa, Ltd., produces manual forklift and platform lift trucks, electric trucks, and conveyors. Indusa S.A. Ind. Metalurgica supplies light- and medium-weight conveyors and racking equipment. Pohlig-Heckel do Brasil S.A. manufactures hoists and conveyors.

Affiliates of U.S. manufacturers of forklift trucks and accessories in Brazil include Equipamentos Clark S.A.; Eaton, Yale & Towne, Ltd.; and Hyster do Brasil S.A. Another U.S. firm, J. I. Case do Brasil, specializes in front-end loaders.

Considerable Brazilian capital is invested in the French-owned firms, Mecanica Pesada S.A. and Fichet & Schwartz Hautmont Cia. Brasileira de Construcao. The former supplies heavy-duty conveyors, bridge cranes, and other cranes, while the latter primarily supplies bridge cranes.

The Japanese company, Ishikawajima do Brasil Estaleiros S.A., produces bridge cranes and gantries. The Norwegian-owned Munch do Brasil S.A. is increasingly active in the manufacture of truck cranes and stacker cranes, and the German-owned Mollers Sulamerica S.A. has recently entered the conveyor field.

Most Brazilian manufacturers of materials handling equipment plan to expand their production of standard equipment. A few, such as Munck, Villares, and Bardella, also have moved into the production of more advanced equipment. Until the market expands considerably, however, most domestic firms will remain committed to traditional equipment, while sophisticated equipment will continue to be imported.

Because domestic production is unable to satisfy the demand for MHE&S, the local industry does not often request protective tariff legislation. The Government prefers users to buy locally produced equipment, but domestic industry cannot always meet specifications, quality requirements, and delivery dates or compete with international prices.

Imports of MHE&S are subject to customs duties ranging from 30% on wheeled or tracked self-propelled cranes to 55% on manual hoists, manual winches, and cargo lifts/elevators. There are no special taxes or charges levied exclusively on MHE&S. Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-242), U.S. Department of Commerce, Washington, D.C. 20230.

Technical Requirements

The characteristics of Brazil's electric power supply for industrial use are 220/380 or 220/440 volts, 60 hertz, single- or 3-phase. Residential power is mainly 110 volts, 60 hertz, although electric power is not standard throughout the country. Brazil uses the metric system of weights and measures.

Major international standards are acceptable in Brazil. The Association of Brazilian Standards (ANT) has not yet formulated national standards specifically for MHE&S. Detailed information on

Table 3.—U.S. exports to Brazil of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	11	15	128	593
Parts for above	48	107	263	1,026
Other cranes, unmounted	302	2,011	1,407	1,618
Other crane parts	124	167	327	514
Subtotal, cranes and parts	485	2,300	2,125	3,751
Hoists	153	61	308	282
Parts for hoists	108	26	302	72
Derricks	556	3	184	—
Winches	56	51	59	210
Parts for above, etc.	2,137	4,119	3,453	9,101
Hydraulic jacks, parts	59	61	100	110
Other jacks and parts	72	24	86	104
Other lifting equipment	144	153	206	1,057
Subtotal, lifting equipment	3,285	4,498	4,698	10,936
Elevators, escalators	73	—	14	454
Parts for above	63	33	30	36
Gravity conveyors	—	—	2	31
Overhead conveyors	—	—	—	13
Pneumatic conveyors	38	21	59	51
Wheeled conveyors	2	—	13	56
Other conveyors	442	703	1,037	1,656
Parts for conveyors	234	173	706	740
Subtotal, conveyors and parts	852	930	1,861	3,037
Used and rebuilt tractor shovel loads (TSL)	6	202	9	—
Front-end loaders for mounting on TSL	76	97	—	—
Subtotal, loaders and used TSL	82	299	9	—
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	371	520	701	135
4-wheel drive, -1	233	118	421	73
4-wheel drive, 1-1.49	23	26	—	—
4-wheel drive, 1.5-1.99	156	758	426	148
4-wheel drive, 2-2.49	968	839	54	223
4-wheel drive, 2.5-3.49	1,140	4,226	4,575	4,602
4-wheel drive, over 3.5	1,144	2,591	2,587	1,629
Subtotal, wheeled TSL	4,035	9,078	8,764	6,810
Total, lifting, loading, and conveying equipment	8,739	17,105	17,457	24,534
Industrial vehicles (IV)				
Walking and powered IV	17	21	123	53
Electric-powered IV	26	22	79	533
Gasoline-powered IV	849	740	175	275
Other-powered IV	69	115	48	316
Portable stackers	22	2	1	—
Parts for above	1,675	1,817	1,963	2,608
Total, industrial vehicles	2,658	2,717	2,389	3,785
Total, materials handling equipment	11,397	19,822	19,846	28,319
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng.	68	38	9	—
45-59.9 eng.	8	—	114	—
60-89.9 eng.	386	713	481	140
Over 89.9 eng.	872	1,976	955	4,180
Subtotal, tracklaying TSL	1,334	2,727	1,559	4,320
Underground loaders	—	7	84	37
Parts for above	4	23	49	—
Oil fld. rod-lift equipment	35	6	7	—
Oil fld. derrick, pts.	—	13	253	—
Other fld. lift equipment	475	305	111	138
Farm elevators	8	1	—	—
Parts for farm elevators	—	—	—	—
Automobile lifts	3	11	—	—
Undergr. mine conveyors	—	—	—	—
Subtotal, tracklaying and other equipment	525	366	504	175
Total, tracklaying and other equipment	1,859	3,093	2,063	4,495
Grand total, mechanical handling equipment	13,256	22,915	21,909	32,814

Source: Exports, Commodity by Country, FT-410—1969, 1970, 1971, and 1972, U.S. Department of Commerce, Bureau of the Census.

technical requirements can be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

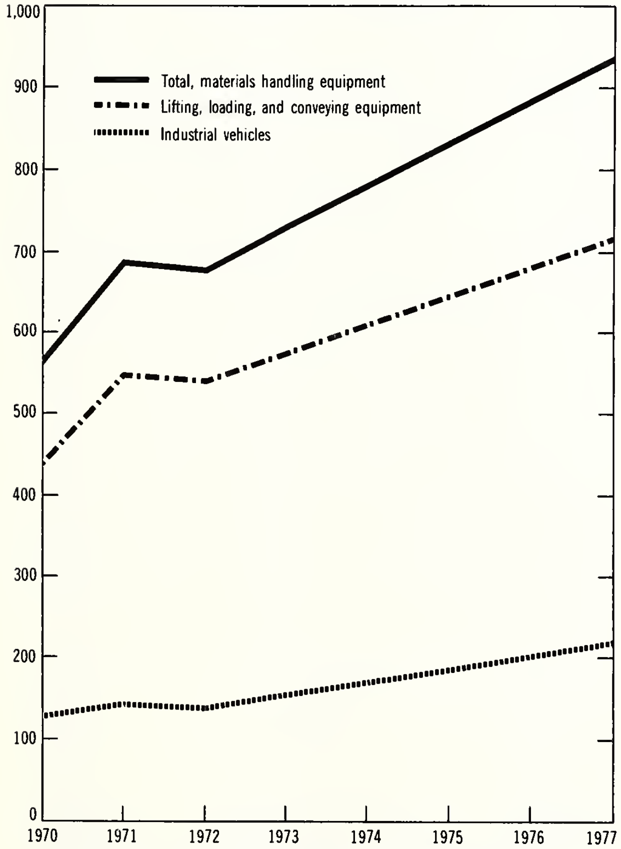
"The Market for Materials Handling Equipment and Systems in Brazil," DIB 73-12-500, April 1973.

France

Demand for materials handling equipment and systems (MHE&S) in France is expected to rise sharply between 1972 and 1977 as mounting labor and inventory handling costs induce industrial firms in that country to continue making substantial investments in capital equipment.

France: Materials handling equipment market, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by Office of International Marketing, U.S. Department of Commerce, official French statistics, and trade estimates.

French MHE&S purchases climbed from $568 million in 1970 to an estimated $678 million in 1972, representing an increase of 20% (see table 1). The market for materials handling equipment is projected to expand by 38% between 1972 and 1977, placing the market at $934 million in the latter year.

Lifting, loading, and conveying equipment accounted for 80% of France's total MHE&S market in 1972. Expenditures for such equipment, valued at $539 million in 1972, are expected to reach $715 million in 1977. Sales of industrial vehicles were $139 million in 1972 and should increase 57% by 1977 to $219 million. Specialized equipment and advanced materials handling systems are becoming increasingly necessary in many French industries.

The trend toward larger production units and the rise in spare parts requirements have created difficult materials handling problems. As a result, trade sources anticipate a marked rise in the application of advanced technology to materials handling operations, both in production lines and in storage and retrieval systems.

Imports account for almost one-third of French materials handling equipment requirements. Imports totaled $206 million in 1972, representing a 52% increase over the 1970 level of $134 million. Foreign suppliers are expected to maintain a strong position in the French market and to supply MHE&S valued at more than $363 million in 1977.

U.S.-made mechanical handling equipment has been well received in France. The value of U.S. exports reached $27 million in 1970, representing a market share of 20% (see table 2).

U.S. exports of mechanical handling equipment to France declined in 1971 to $20 million but jumped substantially in 1972 to an estimated $37 million. Exports to France should exceed $54 million by 1977, and could go even higher, due to the unprecedented interest in advanced equipment and systems.

Germany held 36% ($49 million) of France's import market in 1970, the largest single share. Following the United States ,the second largest supplier, came Italy, with 13% ($18 million). Belgium's exports represented 9% ($12 million) of France's import market, and the Netherlands claimed a 6% share ($9 million).

Specific Sales Opportunities

Favorable sales prospects for American manufacturers of the following products are revealed in a market research study recently conducted in France for the U.S. Department of Commerce:

Lifting, Loading, and Conveying Equipment
- Conveyors and conveying systems
- Monorails
- Overhead traveling cranes

Industrial Vehicles
- Small mobile powered trucks
- Narrow-aisle powered trucks
- Side-loading powered trucks
- Electronically controlled industrial vehicles

Systems and Specialized Equipment
- Automated storage and retrieval systems
- Container handling equipment
- Computerized materials handling systems
- Air-cushion handling systems
- Speed-control devices for electric forklift trucks

Lifting, loading, and conveying equipment.—French efforts to reduce production costs by increasing handling speeds, lowering labor costs, and improving storage methods should strengthen the market for advanced lifting, loading, and conveying equipment during the next few years. American MHE&S manufacturers are in a good position to supply growing French requirements for advanced equipment because U.S. products represent the most advanced technology available.

Continuous materials handling systems will be needed to integrate manufacturing and handling processes and to modernize existing handling systems. The use of automatic conveyor systems is expected to grow steadily in industrial firms, particularly firms in the food, machinery, transportation equipment, and wholesale trade sectors. Conveying systems capable of following complex paths while requiring little space are high priority items.

Monorails will be used increasingly, especially by automobile manufacturers, the postal service, and industries dealing with nondurable goods. U.S.-origin conveyors and monorails are generally thought to be technically superior and should do well in the French market. Overhead traveling cranes also offer good sales potential for U.S. exporters, since there are no major domestic producers.

Industrial vehicles.—The high cost of labor in France is a major factor underlying the growing demand for industrial vehicles. The laborsaving benefits of industrial trucks, coupled with their flexibility and suitability for use by firms not yet ready to invest in conveyor systems, are prompting an increasing number of French manufacturers to use industrial vehicles in production operations. Small mobile powered trucks are favored by French end-users, as also are narrow-aisle and side-loading powered trucks. U.S. manufacturers are the sales leaders in the expanding market for electronically-controlled industrial trucks.

Table 1.—France: Size of market for materials handling equipment, 1970-72 [1]
(in millions of U.S. dollars)

	1970	1971	1972 [1]
Lifting, loading, and conveying equipment			
Production	482.4	611.4	627.7
Imports	105.6	135.9	162.5
Exports	147.3	200.2	250.9
Market size [2]	440.7	547.1	539.3
Industrial vehicles			
Production	136.8	144.3	161.5
Imports	28.4	35.0	43.5
Exports	38.0	38.1	66.3
Market size	127.2	141.2	138.7
Totals, materials handling equipment			
Production	619.2	755.7	789.2
Imports	134.0	170.9	206.0
Exports	185.3	238.3	317.2
Market size	567.9	688.3	678.0

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[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values based on data of the Syndicat des Industries de Materiels de Manutention (SIMMA). Foreign trade values based on data from the Customs Office, French Ministry of Commerce.

Table 2.—Exports of mechanical handling equipment[1] to France by principal suppliers, 1969-71
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	26.1	22.4	27.1	19.9	20.2	12.6
Germany	44.3	38.0	49.0	36.0	65.4	40.6
Italy	14.6	12.5	17.8	13.1	18.9	11.7
Belgium	7.7	6.6	11.9	8.8	15.6	9.7
Netherlands	6.9	5.9	8.9	6.5	10.0	6.2
Others	17.0	14.6	21.3	15.7	30.9	19.2
Total	116.6	100.0	136.0	100.0	161.0	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by the Organization for Economic Cooperation and Development (OECD), based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

Systems and specialized equipment.—French efforts to streamline storage and retrieval systems are creating excellent sales opportunities for American manufacturers, who are leaders in the field of automated systems. The need for more sophisticated storage systems is especially acute in the French automobile industry, in mail order houses, and among drug manufacturers.

The market for container handling equipment is a promising one for U.S. exporters. Good sales potential also exists for American manufacturers of speed-control devices for electric forklift trucks. The growing volume of international trade has contributed to French interest in containerization. With more containers being utilized, the need for container handling equipment is mounting rapidly. There is a trend among many major French MHE&S users toward the utilization of air-cushion handling equipment and computer-controlled handling systems.

End-User Analysis

Industrial and service firms in France are becoming increasingly conscious of the opportunity to reduce costs and increase efficiency in their manufacturing and distribution processes through the application of improved materials handling techniques. French purchases of MHE&S in 1971 totaled $688 million; almost half of the 1971 purchases were made by end-users in the following sectors of the economy—machinery, transportation equipment, wholesale trade, food, and transportation and communication services.

Machinery.—The machinery sector in 1971 accounted for 14% of France's gross national product. The sector's value of shipments reached $31 billion in 1971 and its employment was 820,000 persons. The machinery industry is expected to maintain the 5% annual average growth rate forecast in the French Government's Sixth Plan for Economic and Social Development (1971-75). Purchases of materials handling equipment and systems in the machinery industry are believed to have exceeded $100 million in 1971. New plant construction, in particular, should continue to spur the sector's demand for MHE&S.

Sales in the electrical machinery segment of the industry increased 20% in 1971, and an annual expansion rate of 15% is projected for the next several years. The largest electrical machinery and electronics equipment manufacturers are considering the adoption of more advanced automatic control systems for production lines, and some firms already have installed pilot plants to test controls. Automatic storage systems for spare parts are fast becoming essential in this sector as the volume of spare parts mounts and management becomes increasingly sensitive to rising inventory costs.

Many electrical machinery firms are turning to pneumatic conveyors to gain speed and increase flexibility in the manufacturing process. The ever-present need to reduce operating costs and speed up assembly line operations should give rise to a wider use of monorails in both production and storage. The growing sophistication of the industry will also result in a higher demand for computerized materials handling systems.

Massey Ferguson S.A., a major factor in the French machinery industry, is striving to improve its operating efficiency through advanced MHE&S applications. It allocated some $900,000 for materials handling equipment in 1973. This company is presently developing a continuous handling system which will incorporate overhead monorail chain conveyors and stacking cranes to accelerate and integrate all production processes. Advanced equipment already being used by Massey Ferguson includes electrically-controlled conveyors and automatic storage and retrieval equipment with a computerized control system for the spare parts inventory.

Transportation equipment industry.—France's transportation equipment industry, with annual production estimated at over $32 billion and a labor force of 680,000 employees, constitutes an excellent market for advanced materials handling equipment and systems. This industry has ambitious plans to increase exports, broaden its domestic market, and modernize its production plants during the next few years. The sector was expected to grow by 8% in 1973.

MHE&S purchases by the transportation equipment industry in 1971 were estimated at $85 million. Most of the purchases originated with automobile manufacturers, who are expected to spend almost $100 million on MHE&S in 1974. To increase productivity and simultaneously decrease handling costs, the industry plans to make greater use of advanced materials handling techniques.

Electronically-controlled forklift trucks, automatic storage systems for spare parts, and computerized control consoles for production lines are expected to be adopted in the near future. Conveyors and monorails will be needed by many firms to improve their materials handling capability.

Chrysler France, the fourth largest French automobile manufacturer, uses overhead monorail chain conveyors to automatically feed automobile bodies to the main assembly lines and painting area. It also has a semiautomatic assembly line for gear boxes. The firm plans to renovate its main plant in Poissy over the next few years. Renovation plans include the modernization of its spare parts storage system through computerization, the installation of automatic warehousing carriers, and the purchase of electronically controlled forklift trucks.

Wholesale trade.—Wholesale trade accounts for 10% of France's GNP and employs 180,000 persons. Sales in this industry sector increased nearly 16% in 1972, and an 11% growth rate was forecast for 1973.

MHE&S expenditures by the wholesale trade totaled $70 million in 1971. As competition within the trade increases, wholesale firms can be expected to modernize their operations. As a result, the market for materials handling equipment and systems should expand significantly through the remainder of the decade.

Expenditures for MHE&S probably will exceed $80 million by 1975. Among the products in which wholesalers should show great interest for the immediate future are electronically-controlled conveyor systems, advanced industrial trucks and palletizers, and automatic storage systems for warehouses.

Au Printemps, a leading Parisian wholesale firm, invests an average of $650,000 annually in materials handling equipment. It presently uses overhead monorail chain conveyors and a computerized inventory control system and plans to begin using air-cushion handling and high-bay storage equipment in the near future.

Food and kindred products.—Demand for advanced materials handling equipment and systems should increase as the French food industry continues to concentrate production among fewer companies and to build larger plants. Food manufacturing companies have 250,000 employees and annual production was valued at $15 billion in 1972. The Government's Sixth Plan projects an average annual growth rate of 7% for this sector through 1975. The food industry's purchases of materials handling equipment in 1971 amounted to $52 million and should exceed $60 million in 1974.

Because of the high cost of labor in France, many food processors are adopting advanced control equipment for positioning, storage, and retrieval functions as an alternative to increasing their work force.

Conveyors, the most important type of equipment in food processing systems, will continue to be used extensively, and producers are receptive to innovative applications of the conveyor concept. Monorails are also used widely in production and storage operations. Food firms are studying the advantages of supplementing their forklift fleets with automatically controlled truck-mounted cranes.

SOPAD-Nestle, located in Courbevoie, is the fourth largest French food processor in terms of sales and is considered a market leader throughout Europe.

Advanced MHE&S systems presently in use at SOPAD include stacker cranes, shrink packaging equipment, a magnetic-band conveyor for transporting cans, and fixed storage racks to prevent packed food from being crushed. SOPAD uses partially automated conveyor systems with both manual and computerized controls. Its control devices consist of electronic sensors and photocells, supersonic sounding devices, and microswitches to prevent jamming on the conveyors.

SOPAD expects to increase its profits and performance by computerizing storage procedures and by introducing air-cushion handling techniques. A new packaging systems is also being considered because the shrink packaging machines now in use are considered too expensive.

Transportation and communication services.—French transportation and communication services contribute 3.7% to the GNP and employ 450,000 persons. Although the sector's MHE&S purchases amounted to a relatively modest $20 million in 1971, its apparent readiness to utilize sophisticated equipment makes it a good sales target for American exporters.

Heavy investments in road, rail, and urban transportation are anticipated as France attempts to handle steadily increasing surface traffic. Transportation firms are expected to become major users of computer-controlled conveyor systems and control consoles for operating mechanized circuits. Conveyors and monorails for semiautomatic continuous handling systems are in great demand, and a trend toward the use of semiautomated storage systems is evident.

There is growing interest in purchasing radio-controlled trucks and trucks that move on a rail path. End-users are also planning to purchase trucks equipped with nippers for lifting heavy items, although electronically-controlled forklifts are still in demand. Trucks equipped with pneumatic systems for tightening the nippers are preferred.

Air France, based in Paris, is considered one of the most advanced MHE&S users in the transportation sector. The company uses a computer-controlled automatic storage system that permits the storage of up to 1,470 tons of goods in seven rows of racking at eight different levels. Seven electronically-controlled stacker cranes are used. Each stacker crane possesses a memory capable of receiving six different instructions for the storage or removal of goods, and confirmation that all such operations have been carried out is automatically transmitted to the computer.

Air France's warehouse control console monitors the mechanized operations of the storage system and transmits information from the computer to the storage units. Nine IBM control units connect two central IBM 360/40 computers to 91 terminals distributed throughout the warehouse and to two terminals in the loading section. The airline is beginning to equip a new automated air cargo terminal at Roissy en France.

Competitive Environment

France's materials handling equipment industry is one of the world's largest. Domestic production in 1972 was valued at $789 million, and French exports of MHE&S reached $317 million in that year.

Some 400 French firms, with a labor force exceeding 30,000, manufacture materials handling equipment. Most firms are family-owned and offer narrow product lines. Foreign subsidiaries are responsible for approximately 13% of the domestic production.

The Sixth Plan envisions an average annual growth rate of 13.2% in the French MHE&S industry for the period 1971-75. Trade sources feel that production may increase as much as 15% annually through 1975.

Some of the leading French firms specializing in continuous handling systems and related equipment are Ameco, Berthelat, Boubiela, Compagnie Francaise des Convoyeurs, Campagnie Generale de Manutention et Stockage, and Melius. In addition, Rapistan Lande, a subdiary of the U.S. firm Rapistan, offers continuous handling systems as well as storage installation. Labinal, Neu, Saunier-Duval, and Systeme Fix produce storage apparatus.

French forklift truck producers include Blereau Peg and Braud et Faucheux. Three U.S. subsidiaries, Allis Chalmers France, Clark Equipment France, and Fenwick Manutention, also manufacture forklift trucks in France. Firms such as MIC, Forges de Vulcain, Hervieu, and Slingsby produce industrial trucks.

Fenwick produces a broad range of materials handling equipment, such as monorails, overhead traveling cranes, and warehousing carriers. Other French manufacturers that include overhead traveling cranes in their product lines are Chainette, Dewet, Tourtellier, and Verlinde.

U.S. materials handling equipment faces keen competition, not only from domestic suppliers but also from European suppliers. More than a dozen important German manufacturers are active in the French market. These include Ameise, Bartels, Brenneisen, Demag, Dixi Mucke, Fredenhaigen, Fromme, Genkinger, and Saxby. Among the British companies exporting materials handling equipment to France are Conveyancer, Folksburroughs, King, Lansing Bagnall, Lerner, Ransomes, and Serien Packer.

Also represented in the French MHE&S market are such firms as Calzoni, Fata, Fiat, and OM of Italy; BT and LMV of Sweden; Ammeraal of the Netherlands; Balkancar of Bulgaria; and Machinoexport of the U.S.S.R.

France has no restrictive "buy national" policy for materials handling equipment. Satisfactory after-sales service from domestic and foreign suppliers is widely sought by the French MHE&S consumer. French firms generally prefer to deal with suppliers who can provide equipment feasibility and consulting services.

Payment for materials handling equipment and systems varies between 1 and 6 months after billing. Foreign suppliers usually deliver standardized equipment such as forklift trucks within 1 month, although French customers expect a longer waiting period for major purchases. Suppliers generally give a 12-month warranty for spare parts and labor. After the first year, end-users and manufacturers often sign a 2- to 3-year renewable maintenance contract.

France allows duty-free entry of MHE&S imports from the other original members of the European Economic Community (EEC)—Belgium, Italy, Luxembourg, the Netherlands, and Germany. Starting April 1, 1973, duties on equipment from Great Britain, Ireland, and Denmark are being decreased by

Table 3.—U.S. exports to France of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	—	27	37	741
Parts for above	20	25	116	58
Other cranes, unmounted	2,026	2,040	980	693
Other crane parts	217	274	522	450
Subtotal, cranes and parts	2,263	2,366	1,655	1,942
Hoists	215	135	100	111
Parts for hoists	75	56	16	24
Derricks	165	197	121	402
Winches	195	51	128	220
Parts for above, etc.	8,985	10,096	6,782	6,797
Hydraulic jacks/parts	44	56	24	49
Other jacks and parts	18	13	11	34
Other lifting equipment	67	37	409	1,054
Subtotal, lifting equipment	9,764	10,641	7,591	8,691
Elevators, escalators	10	8	1	87
Parts for above	183	119	193	107
Gravity conveyors	—	—	—	44
Overhead conveyors	1	1	—	—
Pneumatic conveyors	13	7	149	22
Wheeled conveyors	5	—	—	—
Other conveyors	190	606	725	246
Parts for conveyors	134	144	142	14,188
Subtotal, conveyors and parts	536	885	1,210	14,694
Used and rebuilt tractor-shovel loaders (TSL)	1	44	2	—
Front-end loaders for mounting on TSL	148	23	9	—
Subtotal, loaders and used TSL	149	67	11	—
Tractor-shovel loaders (TSL) with bucket size in cubic yards				
2-wheel dr., all	29	198	140	845
4-wheel dr., -1	—	—	—	21
4-wheel dr., 1-1.49	220	—	60	20
4-wheel dr., 1.5-1.99	1,200	508	178	634
4-wheel dr., 2-2.49	1,178	429	134	286
4-wheel dr., 2.5-3.49	195	1,077	541	639
4-wheel dr., over 3.5	4,869	5,582	3,720	4,281
Subtotal, wheeled TSL	7,682	7,794	4,773	6,726
Total, lifting, loading, and conveying equipment	20,394	21,755	15,240	32,053
Industrial vehicles (IV)				
Walking and powered IV	146	156	150	147
Electric-powered IV	—	42	117	253
Gasoline-powered IV	58	260	110	244
Other-powered IV	397	629	374	271
Portable stackers	—	50	2	—
Parts for above	2,515	2,864	1,889	1,626
Total, industrial vehicles	3,116	4,001	2,642	2,541
Total, materials handling equipment	23,510	25,756	17,882	34,594
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 Eng. H.P.	416	79	—	—
45-59.9 Eng. H.P.	—	13	—	—
60-89.9 Eng. H.P.	486	64	243	216
Over 89.9 Eng. H.P.	1,340	835	1,717	2,770
Subtotal, tracklaying TSL	2,242	991	1,960	2,986
Underground loaders	23	37	—	27
Parts for underground loaders	284	270	169	70
Oil fld. rod-lift eq.	—	11	16	—
Oil fld. derrick pts.	7	44	118	—
Other oil fld. lift eq.	43	32	29	65
Farm elevators	1	—	—	—
Parts for farm elevators	—	1	—	—
Automobile lifts	7	1	—	—
Underground mine conveyors	—	—	—	—
Subtotal other equipment	365	356	332	162
Total, tracklaying and other equipment	2,607	1,347	2,292	3,148
Grand total, mechanical handling equipment	26,117	27,103	20,174	37,742

20% per year until imports from these countries achieve a duty-free status. For all other countries, including the United States, customs duties range from 4 to 9%.

Duties on leased equipment are calculated on 60% of the total value of the equipment or system. A clearing tax, amounting to 2% of the customs duties, is levied on all imports, and domestic and foreign suppliers must also pay a 20% value added tax. Information on specific duty rates can be obtained from the Domestic and International Business Administration (DIBA-226), U.S. Department of Commerce, Washington, D.C. 20230.

Technical Requirements

There are no special labeling requirements for imported materials handling equipment and systems. Electric current generally used in France is 220/380 volts, 50 hertz, single-phase or 3-phase. The metric system of weights and measures is used exclusively.

Stringent safety rules issued by the Institut National de Recherche et de Securite (INRS), 9 Ave. Montaigne 75008, Paris, govern the use of materials handling equipment. Industrial trucks, for instance, are expected to be equipped with a head protector for the driver, wire netting to separate machinery from driver, a protective shield for the driver's place, and a warning signal.

Detailed information on technical standards can be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

Official statistics of the U.S. Bureau of Census annual publication, *Exports, Commodity by Country, FT-410,* show in detail in table 3 U.S. exports of materials handling equipment to France in selected years.

The following market research is available from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

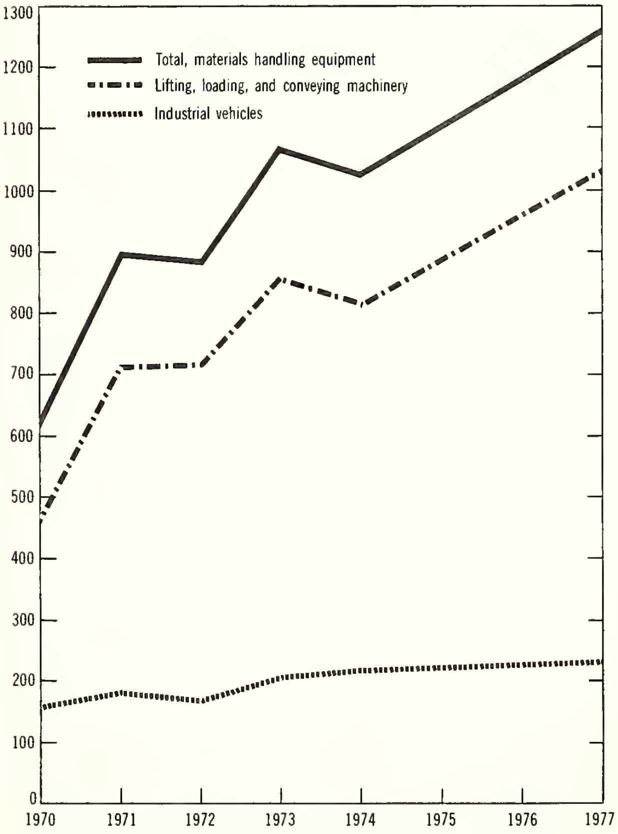
"The Market for Materials Handling Equipment and Systems in France," DIB 73-12-509, March 1973.

Germany

German industry is investing heavily in labor-saving materials handling equipment and systems (MHE&S) of all types as a result of serious labor shortages and spiraling wages. The market for MHE&S rose from $627 million in 1970 to $885 million in 1972, an increase of over 40%. (See table 1.) Growth is expected to continue at a steady 7.3% rate through 1977, when sales are forecast to exceed $1.25 billion, double the 1970 figure.

Germany: Materials handling equipment market, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by the Office of International Marketing, U.S. Department of Commerce, official German statistics, and trade estimates.

Sales of lifting, loading, and conveying equipment, which account for four-fifths of the MHE&S market, totaled $717 million in 1972. A 40% increase in sales is expected by 1977, bringing the total to over $1 billion. Sales of industrial vehicles are projected to increase by 35% between 1972 and 1977, rising from $168 million to over $226 million.

Although local production satisfies most of Germany's requirements for materials handling equipment and systems, imports grew from $85 million in 1970 to $114 million in 1972, accounting for 13% of the total market in the latter year. Imports are expected to increase to $122 million in 1973, and then, because of rising domestic production, are likely to level off at just over $100 million annually through 1977.

Imports of *materials* handling equipment from the United States should continue to increase substantially, however, because of currency realignments and the recognized high quality of American-made equipment. U.S. exports of *mechanical* handling equipment to Germany grew from a total of $21.6 million in 1969 to $24.3 million in 1971 (see table 2), when U.S. suppliers claimed a 14% share of the import market. Accelerated marketing by U.S. firms could raise the U.S. share to well over 20% by 1977.

France is the leading foreign supplier of mechanical handling equipment to Germany and in 1971 exported equipment valued at $48.1 million, representing a 27% share of the German import market. Other important suppliers include the Netherlands, with 1971 exports of $20 million (11%); Italy,

Table 1.—Germany: Size of market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	642.7	923.3	985.6
Imports	52.8	79.2	85.6
Exports	227.2	290.1	354.5
Market size[2]	468.3	712.4	716.7
Industrial vehicles			
Production	188.9	228.6	223.3
Imports	32.4	36.2	28.0
Exports	62.3	79.2	82.8
Market size	159.0	185.6	168.5
Totals, materials handling equipment			
Production	831.6	1,151.9	1,208.9
Imports	85.2	115.4	113.6
Exports	289.5	369.3	437.3
Market size	627.3	898.0	885.2

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[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values and foreign trade values based on data reported by the Statistisches Bundesamt, trade values based on data of l'Institut National de Statistique.

$18.9 million (11%); and Sweden, $12.5 million (7%).

Statistics taken from the U.S. Bureau of the Census annual publication, *Exports, Commodity by Country, FT-410,* show in detail U.S. exports of mechanical handling equipment to Germany in selected years. (See table 3.)

Specific Sales Opportunities

A recent market research study conducted in Germany for the U.S. Department of Commerce shows the following American-made materials handling equipment to have a favorable sales potential:

Lifting, Loading, and Conveying Equipment

- Mobile cranes
- Chain belt conveyors
- Mobile conveyors
- Chain belts
- Steel belts
- Lifting chains

Industrial Vehicles

- Van carriers for containers
- Die handlers
- Tow tractors
- Pallet loaders
- Forklifts
- Forklift attachments
- Parts

Systems and Specialized Equipment

- Automatic palletizing and depalletizing equipment
- Automatic commissioning equipment
- Coding systems for automatic read-out

Lifting, loading, and conveying equipment.—U.S. industry has been particularly strong in the German import market for mobile cranes and accounted for about 40% of total imports of this equipment in 1971. Mobile cranes with a capacity of up to 80 tons are finding increasingly wider use in the building trades for transporting prefabricated components and other building materials. A market also exists for mobile cranes with capacities of from 4 to 12 tons to replace gantry cranes currently used in handling empty 40-foot containers. German purchases of U.S. harbor cranes, primarily for off-shore drilling platforms, amounted to just over $2 million in 1971.

High-grade alloy lifting chains, which were introduced in the German market by U.S. firms, are now widely accepted. The total market for this equipment was estimated at $2.2 million in 1972, with U.S. manufacturers supplying about 60%.

German end-users in 1971 purchased conveyors valued at $170 million, of which 10% was imported. U.S. manufacturers of conveying equipment and parts should find expanding sales opportunities in the automotive and steel industries, where belt conveyors designed to withstand extreme conditions are in great demand. High-quality chain belts for extreme conditions are also needed by German conveying equipment manufacturers. Other types of conveying equipment expected to offer a promising market for U.S. firms include knocked-down conveyors; special conveyors and jointed steel belts for conveyors for use in the disposal of industrial waste and garbage; and mobile conveyors, which are required by the sand, gravel, and clay industry to replace stationary installations.

Industrial vehicles.—Forklifts remain the most important single item in the German MHE&S market. Sales of forklifts in 1971 totaled 19,600 units, valued at over $118 million. The market for these trucks is expected to grow 35% by 1977. Demand will be highest for forklifts with capacities of 3 to 3½ tons. Sales of smaller battery-driven units and large diesel units of up to 8-ton capacity are also expected to increase. Purchasing decisions are based more on the handling ease and reliability of the forklifts than on price and operating costs.

Many German buyers require forklifts that are equipped with optical or acoustical signals to indicate attainment of load capacity. Other forklift attachments that should prove highly marketable include clamps for bags, barrels, drums, and coils; tilting equipment; and attachments for handling long materials such as tubing and carpets. Parts and attachments accounted for about 86% of the value of U.S. exports of industrial vehicles and parts to Germany in 1971. Most of the parts are original equipment for local manufacturing.

U.S. manufacturers should also find good sales opportunities for their van carriers for containers. The ports of Hamburg and Bremen/Bremerhaven operate about 60 van carriers valued at approximately $200,000 each. Between 25 and 30 new van carriers will be purchased over the next 2 to 3 years for port use. The annual market for die handlers used by German automobile manufacturers amounts to 10 units, most of which are supplied by U.S. manufacturers.

Purchases of tow tractors for airport use should rise significantly as air traffic increases, and U.S. companies are expected to supply a major portion of these vehicles. Some 150 pallet loaders are currently in use at airport facilities, and the annual market is estimated at 30 units. Air-cushion pallets for heavy loads have recently been introduced and should become strong sellers.

Systems and specialized equipment.—The German market for systems and specialized equipment also is expected to provide sales opportunities for U.S. firms. A recent survey of German industry indicated that many end-user firms are considering integrating automated materials handling systems into their production and storage operations whenever the optimum time arrives. Near-term purchases, however, are likely to be concentrated on improved types of conventional equipment.

American manufacturers should find a strong market for certain types of specialized equipment. Interest is growing in automatic palletizing and depalletizing equipment and steel banding machines. Current methods for coding systems are based on signs posted or printed for reading by photoelectric devices. Improved coding systems based on magnetic devices should be attractive to German industrialists. A need also exists for software packages for operating high-bay warehouses.

The commissioning of orders is still largely done by hand and is a major cause of high distribution costs. Automated order-filling is generally possible only where complete pallets or constant quantities of single items are moved. A reasonably priced, simplified, automated system capable of handling articles of differing sizes and weights should find a strong market in Germany.

End-User Analysis

The German gross national product (GNP) is expected to grow about 5.5% annually over the next 3 years. With wages increasing at a rate of 7% a year and labor productivity increasing at only 5% a year, management is under pressure to reduce labor costs. Investment in laborsaving materials handling equipment and systems consequently is expected to exceed overall industrial investment and to increase at a rate of up to 8% per year.

Materials handling equipment and systems are used extensively in production and storage operations in Germany. Vertical materials handling systems predominate on production lines, with 52%

Table 2.—Exports of mechanical handling equipment to Germany by principal suppliers, 1969-71[1]
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	21.6	24.6	25.9	18.1	24.3	13.8
France	18.4	21.0	35.6	24.8	48.1	27.3
Netherlands	10.3	11.7	17.4	12.1	20.0	11.4
Italy	6.7	7.6	14.1	9.8	18.9	10.7
Sweden	6.5	7.4	10.2	7.1	12.5	7.1
Others	24.4	27.7	40.3	28.1	52.2	29.7
Total	87.9	100.0	143.5	100.0	176.0	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities,* Series C, Volume III, 1969, 1970, and 1971, published by OECD, based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

of such systems relying on forklift trucks, 13% on vertical conveyors, 10% on chutes, 4% on bucket conveyors, and the remaining 21% on other types of vertical materials handling equipment. Approximately 35% of all automatic horizontal materials handling systems are based on roller conveyors; 16% are based on circular and swing conveyors; 10% on drain chain conveyors; 7% on floor and underfloor chains; 4% on remote-controlled trains; and 28% on other types of equipment.

Storage systems vary considerably from industry to industry. The electrical industry, for example, relies on block storage and hand racks for 50% of its storage needs, pallet racks for 35%, and high-bay warehouses for 8%. The chemical industry uses block storage and hand racks in up to 60% of its storage systems, with pallet racks and high-bay warehouses used for the remainder. Storage systems in the metalworking industry are predominantly based on pallet racks, block storage, and hand racks, while high-bay warehouses account for about 5% of this industry's storage systems. The food industry has considerably different requirements and relies on pallet racks for 35% of its storage needs, on block storage and hand racks for 25%, and on high-bay warehouses for 12%.

The five most important user industries of materials handling equipment in Germany are the machinery, chemical, electronics, food, and automotive industries, which together account for more than half of the country's annual industrial output and almost half of its annual industrial capital investment. These industries compromise 70% of the total German market for materials handling equipment and systems.

Machinery.—Fourteen percent (1.2 million) of all German workers are employed in the machinery industry. The 5,600 firms comprising this industry produced 11.6% ($19.4 billion) of Germany's total industrial output in 1971. Machinery manufacturers invested about $700 million in equipment in 1971. About $77 million (11%) was spent for materials handling equipment. Over the next 3 years, the industry value of production is projected to grow at an annual rate of 4%. Total equipment investments should grow at about 5% per year over the same period. Investment in materials handling equipment is expected to grow more rapidly, however, because of the pressure of rising labor costs and revaluations of the Deutschemark. Export sales, which account for nearly half of total industry sales, are expected to be adversely affected by the revaluation of the mark unless production and distribution costs can be lowered. Management has invested heavily in streamlining and automating production processes, but further mechanization of storage and distribution operations is possible. Investments by the machinery industry in materials handling equipment and systems are expected to exceed $93 million in 1974.

Many of the items handled in the machinery industry consist of heavy parts and equipment. Cranes, therefore, are of major importance. Conveyors of all types are used in assembly lines, and electric- and diesel-powered forklifts are used widely. Other equipment with good market potential includes palletizing and depalletizing equipment and high-quality industrial chains.

Hoesch Maschinenfabrik Deutschland, AG, Dortmund, is one of Germany's oldest machinery manufacturing companies and is typical of many medium-size German companies not geared for mass production of machinery. Its production, valued at $18.4 million in 1971, includes turret lathes, pipe manufacturing equipment, heavy cranes, railroad supplies, hydraulic equipment, and castings. The firm's investment in materials handling equipment totals $3.7 million and includes overhead traveling cranes, pillar cranes, forklift trucks, large and small electric trucks, and conveyors. A 5-year, $2.8-million investment program for 1973-78 provides for the acquisition of a wide range of materials handling equipment, including forklifts, conveyors, and casting cranes.

Chemicals.—The German chemical industry, one of the world's largest, includes 1,750 enterprises with 4,700 plants and 585,000 workers. The industry reported 1971 sales of $16.2 billion, with six companies accounting for $8 billion. The 1971 sales level represented 9.4% of total industrial sales and an increase of 43% over the 1967 level. Total capital investments, excluding investments in land and buildings, amounted to $1.1 billion in 1971. Investments in MHE&S in 1971 were valued at $70 million and are expected to total $94 million in 1974. Total investments and sales are projected to increase at an annual average rate of 7%; investments in materials handling equipment and systems may grow at a somewhat higher rate.

Conveyors of all types are the principal materials handling devices used by the chemical industry. Forklifts and palletizers are standard equipment for loading, unloading, and moving stored goods. The efficient storage and retrieval of many different products is essential in the industry, particularly in the cosmetics and pharmaceutical sectors, and high-bay warehouses and flow racks with stackers and commissioning equipment are used extensively. Requirements for high-bay warehouses and computer-controlled flow racks should increase, as well as requirements for explosion- and corrosion-proof conveyors and forklifts with special attachments.

One of Germany's large chemical companies is Farbwerke Hoechst, AG, with annual sales of over

$4 billion. The main plant at Hoechst employs 30,000 workers, and its 1971 production of plastics, inorganic and organic chemicals, dyes, solvents, fertilizers, and medicines was valued at $1.8 billion.

Transport of materials within the plant is accomplished with 3 straddle carriers, 17 dump tractors, 5 mobile cranes, 13 elevator trucks, 453 forklifts, 2 chain tractors, 22 truck cranes, and several hundred electric trucks. This equipment was valued at $31 million in 1972. The company's purchases of materials handling equipment totals some $1.9 million a year, and $1.6 million is spent for the repair and maintenance of MHE&S. Vertical materials handling equipment used at the plant includes 350 elevators (including passenger elevators) designed for loads of up to 615 tons and averaging $31,000 each in cost.

Materials handling equipment used at Farbwerke Hoechst varies with the product being handled. Fertilizer production utilizes belt conveyors and scraper conveyors. Pyrite is unloaded from ships by cranes to belt conveyors that transport the materials to furnaces. From there it is carried by chain conveyors to cooling stations and by conveyors back to the ships. Granulated plastics are moved by pneumatic conveyors into bins and then into bag-filling equipment. Pharmaceuticals are moved in bulk on conveyors to packing machines and then by roller conveyors to the shipping department.

Dyes are stored in a $1-million, punch-card-controlled, high-bay warehouse system served by 5 stacker cranes; pharmaceuticals are stored in another warehouse served by 20 rack stackers. Other company warehouses also utilize rack stackers. Additional materials handling equipment includes flat, steel cage, and lockable box pallets. Characteristic forklift attachments include drum filters, drum clamps, and bag clamps.

Electronics.—The German electronics industry consists of 2,200 companies with 4,750 plants and 1.1 million workers. Sales in 1972 amounted to $19.7 billion. Investments in 1971 were estimated at $600 million, of which materials handling equipment claimed some $150 million. The electronics industry's consumption of MHE&S is projected to rise to almost $200 million annually by 1974.

Electronics firms produce a wide range of consumer goods and are very cost conscious. They constantly are looking for ways to modernize and automate all phases of production and distribution. Most types of conveying equipment and forklifts are now in use. Efficient storage and commissioning systems are of particular interest at this time; 30 of the 200 high-bay warehouses in Germany are operated by the electronics industry. Demand is expected to grow significantly for pallet stackers, platform trucks, and forklifts with special attachments.

The fast growing company, Robert Krups, manufactures electrical household appliances and has a work force of 3,500. The company's sales increased from $43 million in 1971 to $62 million in 1972. Its 300 products require 6,000 pallet spaces for temporary storage. The company's assembly lines use conveyors, and floor transportation is provided by 14 forklifts. A $1-million, 98-foot, high-bay warehouse completed in 1970 is the heart of the company's storage system. Six thousand pallets are stored by means of 3 computer-controlled stacker cranes. Depalletizing and commissioning are still largely manual operations. Robert Krups spends about $625,000 annually on materials handling equipment. Its 1973 investments will be centered on storage facilities and especially on the expansion of the high-bay warehouse. The firm is currently studying plans to automate commissioning.

Food processing.—The German food processing industry reported sales of $22.2 billion in 1971, a 7.7% increase over 1970 sales. The industry consists of 10,400 plants with 550,000 employees. Investments in 1971 were valued at $765 million, and an estimated $100 million was spent on materials handling equipment. Sales and investments are expected to increase at a rate of 7% a year. Investment in MHE&S is expected to expand at a higher rate as the consolidation of firms continues and as the pressure of rising costs requires further automation of storage and distribution facilities. Projections indicate investments of $125 million in MHE&S by 1974.

The materials handling equipment utilized in the food industry includes conveyors of all types, forklifts, high-bay racks, and computer-controlled flow racks. The industry is interested in purchasing refrigerated, high-bay racks and more efficient depalletizing and commissioning systems. Computer-controlled, high-bay racks with pallet stackers and software packages should prove attractive to large companies that offer a full line of packaged foods.

ETO Nahrungsmittelfabrik Richard Graebener in Ettlingen employs 800 persons in the production of dried soups, canned soups, and sauces. Sales totaled $25 million in 1972 and are growing at 10% per year. Materials handling in the production process is accomplished with conveyors and 10 forklifts. The company's storage system consists of a 105-foot, high-bay warehouse with room for 7,900 pallets serviced by three stacker cranes. Production, storage, and billing are directed by a computer, while commissioning and shipping are done manually. An expenditure of $1.25 million for the expansion of the storage system is anticipated over the next few years. Replacements of conveying equipment are estimated at $300,000 per year. The company is planning to invest heavily in a fully automatic, commissioning system for on-line operation by computer.

Automotive.—The German automotive industry is made up of about 460 enterprises and 850 plants employing 630,000 persons. Sales of $14 billion were reported in 1971. Investments in that year totaled $840 million, of which $60 million went for materials handling equipment and systems. Investments in MHE&S should reach $75 million in 1974.

The industry produced 7.5% more passenger vehicles in 1971 than in 1968, but the sales value rose $25%. The number of trucks produced dropped 10% during that period, while their value increased 30%. Automobile manufacturers are increasing the variety of models, colors, and styles. Larger numbers of different parts needed for finished products have required additional materials handling equipment. Flow racks and other intermediate storage devices have been installed, and standard conveyor systems are now controlled by computers to maintain an even flow of materials and parts.

German industry is watching the reorganization of production-assembly procedures ("job enrichment programs") initiated at one of the Volvo plants in Sweden. Should this program be introduced by the German automotive industry, a large investment in sophisticated automatic equipment would be required.

The materials handling system of the automotive firm Adam Opel, AG (a Division of General Motors Corp.), Russelsheim, is representative of Germany's car and truck manufacturers. Opel employs 36,900 people and produces daily 1,600 automobiles of different models. The company owns 65 miles of conveyors, 236 forklifts of from 1 to 10-ton capacity, 160 industrial tractors, 55 platform trucks with capacities up to 2 tons, 64 electro carriers, 24 heavy die handlers, 500 cranes with capacities from 2 to 50 tons, and 98 electric elevators.

Annual capital investments at Opel during the 1973-77 period will be approximately $13 million. Plans call for the construction of a high-bay warehouse for parts and general improvements and expansion of materials handling capabilities in production, distribution, and storage. The company expects to purchase die handlers valued at $375,000 from U.S. manufacturers over the next 3 years.

Competitive Environment

The German materials handling industry, with production valued at $1.2 billion in 1972, ranked just ahead of Japan as the world's second largest. The United States is the leader, with production of over $2.5 billion in 1972. Growing at a projected average annual rate of 5% from 1952 through 1977, German production is expected to exceed $1.5 billion in the latter year. About 35% of annual production is exported, but this figure could drop to 25% by 1977 as currency realignments make German products less competitive abroad. Because of pressing labor shortages and continually rising wages, German industry has increasingly turned to the use of materials handling equipment and systems, and utilizes the most advanced equipment available.

The domestic MHE&S industry is growing rapidly, particularly in the production of lifting, loading, and conveying equipment. In the period 1969-71, the production of mobile cranes increased 84% and the production of truck cranes rose 126%. German production of conveyors for free-flowing goods increased 59% during the same period, with apron, trough, case, and belt conveyors jumping 176% and pneumatic conveyors, 153%. Production of platform trucks and pallet stackers increased 80% during this period.

A trend toward consolidation may be underway in the German forklift manufacturing industry. Two of the largest manufacturers—Linde AG, Werksgruppe Guldner Aschaffenburg, and SE Fahrzeugwerke GmbH—recently merged; together they account for 25% of total production.

Demag Fordertechnik offers a complete line of lifting, loading, and conveying equipment. Friedr. Krupp GmbH Kranbau and Maschinenfabrik Augsburg-Nurnberg (MAN) are important suppliers of cranes, and Leo Gottwald Werk and Orenstein and Koppel AG specialize in the production of mobile cranes. AEG-Telefunken is a leading supplier of conveyors and conveyor systems, and Carl Schenck Maschinenfabrik GmbH specializes in conveyors for assembly lines. Other major conveying equipment suppliers include Stohr Forderanlagen Salzer GmbH, CFC-Kettenforderanlagen AG, Gammerler GmbH & Co. KG, Pfaff Industriemaschinen GmbH, Dexion GmbH, and Mannesmann Geisel GmbH. Germany's major industrial vehicle manufacturers include H. Jungheinrich and Co. Maschinenfabrik, Linde, and Steinbock GmbH. The country's leading supplier of high-bay warehouses and related equipment is Mannesmann Geisel.

International firms, especially subsidiaries of U.S. companies, are also important domestic producers. U.S. subsidiaries of Clark Equipment Company, BKS-Eaton-Yale, and the Hyster Company hold a 12 to 15% share of the production of forklifts. The Otis Elevator Company, through its subsidiary Flohr Otis, produces 15 to 20% of the elevators. ITT's subsidiary Standard Elektrik Lorenz is a leading manufacturer of conveying systems, including intraoffice pneumatic systems, for hospitals and the postal service. The Electronics Corporation of America has a significant share of the market for electronic controls, and Rapistan-Lande is important in the design and supply of complete materials handling systems. In addition, leading German companies manufacture equipment, especially cranes

Table 3.—U.S. exports to Germany of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	2	—	1,317	1,232
Parts for above	6	—	31	67
Other cranes, unmounted	225	541	2,056	2,223
Other crane parts	508	1,412	445	496
Subtotal, cranes and parts	741	1,953	3,849	4,018
Hoists	19	60	85	184
Parts for hoists	41	46	25	—
Derricks	—	—	—	—
Winches	115	114	91	1,070
Parts for above, etc.	6,476	6,804	3,994	5,514
Hydraulic jacks, parts	24	69	67	487
Other jacks and parts	138	25	18	44
Other lifting equipment	182	653	397	178
Subtotal, lifting equipment	6,995	7,771	4,677	7,477
Elevators, escalators	8	1	—	—
Parts for above	86	65	128	119
Gravity conveyors	8	3	44	—
Overhead conveyors	60	—	—	—
Pneumatic conveyors	2	9	90	29
Wheeled conveyors	2	—	107	—
Other conveyors	102	400	178	113
Parts for conveyors	195	252	1,344	1,406
Subtotal, conveyors and parts	463	730	1,891	1,667
Used and rebuilt tractor shovel loaders (TSL)	—	8	—	110
Front-end loaders for mounting on TSL	34	16	245	—
Subtotal, loaders and used TSL	34	24	245	110
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	41	113	69	98
4-wheel drive, -1	—	197	59	309
4-wheel drive, 1-1.49	—	—	146	97
4-wheel drive, 1.5-1.99	1,094	1,167	678	960
4-wheel drive, 2-2.49	—	226	852	446
4-wheel drive, 2.5-3.49	785	724	997	655
4-wheel drive, over 3.5	4,175	4,003	3,687	3,208
Subtotal, wheeled TSL	6,095	6,430	6,488	5,773
Total, lifting, loading, and conveying equipment	14,328	16,908	17,150	19,045
Industrial vehicles (IV)				
Walking and powered IV	96	63	180	89
Electric-powered IV	115	36	200	34
Gasoline-powered IV	273	131	44	95
Other-powered IV	252	1,173	336	103
Portable stackers	1	4	—	217
Parts for above	2,258	4,412	4,589	3,540
Total, industrial vehicles	2,995	5,819	5,349	4,078
Total, materials handling equipment	17,323	22,727	22,499	23,123
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 engine horsepower	—	—	—	—
45-59.9 engine horsepower	—	—	11	16
60-89.9 engine horsepower	1,462	934	58	695
Over 89.9 engine horsepower	2,756	1,943	1,149	1,724
Subtotal, tracklaying TSL	4,218	2,877	1,218	2,435
Underground loaders	—	—	—	—
Parts for above	3	3	3	—
Oil field rod-lift equipment	5	3	301	120
Oil field derrick, pints	2	149	93	41
Other oil field lift equipment	42	135	167	49
Farm elevators	3	—	—	—
Parts for above	—	—	—	—
Automobile lifts	1	—	—	—
Underground mine conveyors	5	—	30	—
Subtotal, other equipment	61	290	594	210
Total, tracklaying and other equipment	4,279	3,167	1,812	2,645
Grand total, mechanical handling equipment	21,602	25,894	24,311	25,768

and conveyors, under license from American firms. Other manufacturers producing in Germany include Lansing GmbH, a British-owned company with a 10% share of the market for forklifts, and Sandvik Conveyor GmbH, a Swedish-owned firm that manufactures conveyors.

There are no "buy national" programs in Germany, and the Government has enacted no legislation to protect German producers from competition by subsidiaries of foreign firms. Government stabilization programs designed to control inflation will slow the growth of the economy and may inhibit domestic production of materials handling equipment.

The major competitors of U.S. companies in the German import market are French, Dutch, Italian, and Swedish firms. Major French exports to Germany include grabs and hoists, rope winches, magnetic conveyors, continuous systems, and jib, self-propelled, and truck cranes. Dutch manufacturers supply conveying equipment. Italy's Fiat-OM provides forklift trucks, and other Italian companies furnish storage and transport boxes and bins. German industry imports Swedish-made hydraulic loaders, forklifts, overhead traveling bridges, and belt conveyors. Britain's position in the German market can be expected to improve significantly as the full effects of the country's entry into the Common Market are felt.

Germany is a member of the European Economic Community (EEC) and applies the Community's common external tariffs. Import duties on lifting, loading, and conveying equipment from the United States range from 4 to 10%, and duties on industrial vehicles range from 5 to 9.5%. Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-226), U.S. Department of Commerce, Washington, D.C. 20230.

Materials handling equipment sold in Germany is subject to an 11% value-added tax. German companies that import goods for leasing must pay duties on the full market value. Importers may declare goods "temporary imports" and thus postpone payment of duties until the goods are sold.

Standard contracts between U.S. manufacturers and German buyers provide for payment against a bill of lading, with a 1% discount for payment within 60 days. Buyers have the privilege of arranging their own financing or accepting the financing of the U.S. supplier.

Delivery times of 4 to 7 months are considered normal for standard U.S. MHE&S equipment. Expensive sophisticated equipment and systems that require extensive modification to meet European standards require considerably longer delivery, but many dealers are willing to make required alterations after delivery.

End-users may "lease to buy" expensive equipment, but this practice is rare and applies in not more than 10% of all sales. However, about two-thirds of all heavy cranes are sold to companies that rent them for short periods, generally construction firms.

Technical Requirements

Normal electricity supply throughout Germany is 220 volts, 50 hertz, single phase. Heavy electrical equipment is wired for 220/380 volts, 3-phase operation. The metric system of weights and measures is used, and U.S. exporters should calibrate equipment in metric units and label it in German.

Safety requirements for materials handling quipment and systems imported into Germany are issued by three organizations: Verein Deutscher Maschinenbau-Anstalten, e.V., Fachgemeinschaft Fordertechnik, 4 Dusseldorf-Oberkassel, Luegallee, 65; Verein Deutscher Ingenieure, 4 Dusseldorf, Graf-Recke Stresse; and Verband Deutscher Elektrotechniker, 6 Frankfurt/M., Stresemann Allee 21. Safety regulations are enforced by the Vereinigung der Technischen Uberwachungsvereine, e.V., 43 Essen, Huyssenallee 52-56. Detailed information on technical requirements can be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

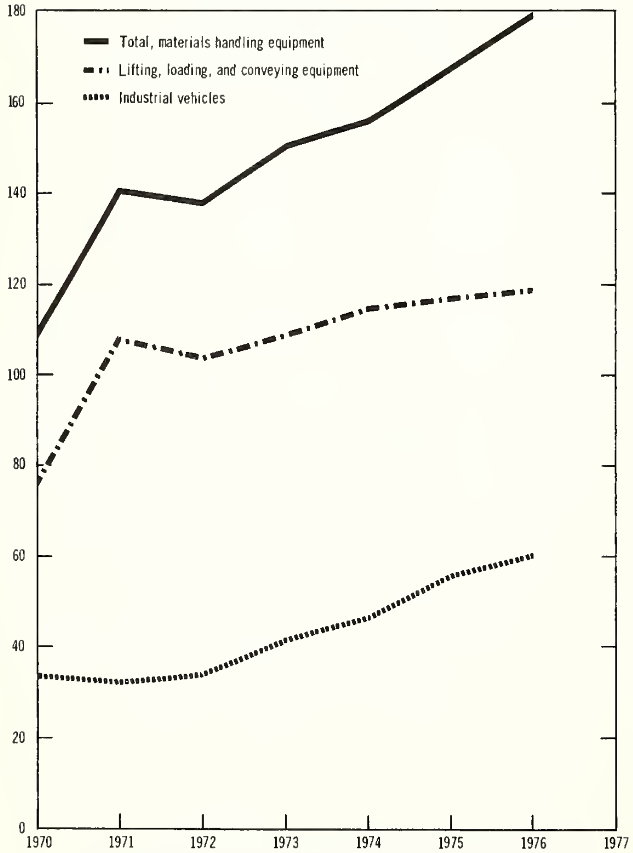
"The Market for Materials Handling Equipment and Systems in Germany," DIB 73-12-512, April 1973.

Italy

Italy's urgent need to minimize the impact of rising labor costs that are threatening the competitive advantage Italian manufacturers have long enjoyed in domestic and world markets is generating increased demand for many types of materials handling equipment and systems (MHE&S).

Italy: Size of market for materials handling equipment, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by the Office of International Marketing, U.S. Department of Commerce, official Italian Statistics, and trade estimates.

Recently negotiated labor contracts requiring Italian management to step up efforts to improve worker safety are stimulating interest in equipment and systems with special safety features.

The market for materials handling equipment, valued at an estimated $138.3 million in 1972 (see table 1), is expected to grow at an average annual rate of 5.3% and reach $179 million in 1977.

Lifting, loading, and conveying equipment accounts for approximately 75% of the market. Italian users spent $104.1 million for such equipment in 1972 and are expected to spend $118 million in 1977.

Sales of industrial vehicles are rising even more rapidly — with a predicted average annual growth rate of 12.3% during 1972-77, compared with the 2.6% annual increase predicted in the lifting, loading, and conveying equipment market during the same period. Italian purchases of industrial vehicles totaled $34.2 million in 1972 and may reach nearly $61 million in 1977.

Foreign suppliers are expected to provide more than half of Italy's materials handling equipment requirements through 1977. Imports of such equipment totaled $63.8 million in 1970, rose to an estimated $87.9 million in 1972, and are projected to reach $94 million in 1977.

The United States exported *mechanical* handling equipment valued at $10.7 million to Italy in 1971 (see table 2) and ranks as the third most important foreign supplier, surpassed only by Germany and France. U.S. suppliers in 1971 held 14% of the Italian import market for mechanical handling equipment. The annual share of U.S. firms is expected to stabilize at about 20%, which would place

Table 1.—Italy: Size of market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	112.3	126.2	128.6
Imports	48.5	72.3	73.1
Exports	84.6	90.5	97.6
Market size[2]	76.2	108.0	104.1
Industrial vehicles			
Production	33.7	37.9	37.7
Imports	15.3	14.3	14.8
Exports	15.3	19.5	18.3
Market size	33.7	32.7	34.2
Totals, materials handling equipment			
Production	146.0	164.1	166.3
Imports	63.8	86.6	87.9
Exports	99.9	110.0	115.9
Market size	109.9	140.7	138.3

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[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values based on data from Confindustrial. Foreign trade values based on *Statistica Annuales del Commercio con L'Estero, 1970 and 1971,* published by the Instituto Centrale di Statistica.

the sales volume at approximately $19 million in 1977.

Germany is the leading supplier of *mechanical* handling equipment, having accounted for over 40% of Italy's imports in the years 1969-71. France ranked second in 1970 and 1971, with a market share of 12.9% in 1970 and 15.5% in 1971. The United States held 17% of Italy's import market for materials handling equipment in 1969 and was in second place. That position could be regained.

Specific Sales Opportunities

Interest in modern methods of materials handling reached a record level during the 1960's, when the demands of Italy's booming industry and that of neighboring countries absorbed most of what had been a labor surplus. The tight labor market drove wages to unprecedented levels.

Demands for manufactured products has been regaining momentum following the economic slowdown of 1969-71, and labor costs are continuing to rise. Small- and medium-size firms, which comprise the majority of Italy's economic enterprises, are finding that they can maintain their competitive position only by streamlining their administration and modernizing production processes. Larger companies are attracted to the more sophisticated equipment and systems now appearing on the market.

A market research study recently conducted in Italy for the U.S. Department of Commerce reveals favorable sales opportunities for American manufacturers of the following products:

Lifting, Loading, and Conveying Equipment

- Conveyors with integrated weighing, testing, and quality control devices
- Conveyors, heavy chain
- Conveying stackers
- Parts and components for belt, roller, and pneumatic conveyors
- In-process robot handling equipment
- Cranes, high payload
- Cranes, dock
- Crane components and accessories
- Gravity-operated storage equipment
- Pneumatic pushers and supports
- Hydraulic jacks
- Lifting equipment for use in metallurgical operations
- Front-end loaders

Industrial Vehicles

- Forklift trucks, internal combustion engine, high payload
- Forklift trucks, electric
- Work trucks for short-distance transport or handling
- Platforms and accessories for industrial trucks and tractors
- Remote-controlled tractors

Systems and Specialized Equipment

- Coding and decoding systems for storage and in-process manufacturing operations
- Storage and retrieval systems
- Computerized warehouse control equipment
- Bin-level indicating equipment, advanced
- Container-handling equipment
- Positioning equipment and systems
- Package and container coding and decoding systems
- Palletizing and depalletizing equipment with load-stabilization devices
- Braking and other safety mechanisms for conveyors and skip hoists
- Coded lightbeam sensors enabling trucks to open or close doors
- Remote-control devices
- Air-cushion transport systems

Lifting, loading, and conveying equipment.—Italy has been importing between 60 and 70% of its requirements for lifting, loading, and conveying equipment. Cranes and related equipment constitute the most important single market in this product category. Italian manufacturers look to the United States for high-payload cranes and special types of cranes because of the high performance, long life, and consequent low maintenance costs of these U.S. products. American manufacturers could begin to receive orders for dock cranes once the Italian Government implements its plan for modernizing the country's port facilities.

The high sales potential of lifting, loading, and conveying equipment used in conjunction with assembly lines is fast becoming a reality. American suppliers find conveying equipment that is integrated with weighing, testing, or quality control devices of interest to Italian manufacturers. The heavy metal processing industry also prefers U.S.-origin chain conveyors. Large Italian firms whose executives have seen in-process robot handling equipment in use abroad are enthusiastic about the prospects for its use in Italy.

Industrial vehicles.—More than 90% of the Italian market for industrial vehicles consists of forklift trucks; overall demand is strongest for models with a 1- to 2-ton payload. Diesel-powered trucks account for 60% of total vehicle sales, electrically powered trucks for 35%, and trucks with internal combustion engines using other than diesel fuel for 5%.

Imports accounted for approximately 40% of 1972 industrial vehicle sales, although this proportion may decline to 30% by 1977. Forklift trucks suitable for lifting operations of 3 feet or more and forklifts with payloads in excess of 2 tons account for most of the imports. The growing importance of electronic controls and automation in forklift trucks should benefit U.S. suppliers, whose trucks have a well-established reputation for advanced design and low maintenance.

Systems and specialized equipment.—Total Italian sales in this product category are expected by 1977 to exceed 1970 sales by more than 70%.

The United States has a technological lead in the development of many kinds of internal transportation systems and in solving problems that require sophisticated software and highly advanced electronics. An effective sales technique that demonstrates the cost benefits of such systems may be required, however, since most Italian manufacturers are just beginning to appreciate the potential cost advantages which can outweigh the initial costs of materials handling systems.

In making their sales proposals, U.S. suppliers should note that the high cost of land in Italy often necessitates multistory warehouses, which could limit the sales potential for systems designed primarily for single-story structures. Furthermore, considerable effort may be required to persuade an Italian businessman that his needs can best be met by a standardized system rather than one tailored to his specific requirements.

Labor union insistence that management take specific steps to reduce on-the-job accidents is resulting in heavy demand for braking and other safety mechanisms for conveyors and other floor-handling equipment, and for lifts and skip hoists.

Italian industry is discovering the possibilities for improving efficiency of the production process by using advanced palletizing and depalletizing equipment, particularly when it is combined with load-stabilization devices. American-made equipment of this type is selling well, and even better sales are foreseen in the near future.

End-User Analysis

Although materials handling equipment and systems are used to some extent in nearly all industrial activities, their use in Italy is heavily concentrated in the manufacturing sector. Other sectors, such as

Table 2.—Exports of mechanical handling equipment to Italy by principal suppliers, 1969-71
(in millions of U.S. dollars)

	1969		1970		1971	
		Market Share		Market Share		Market Share
	Value	percent	Value	percent	Value	percent
United States [1]	8.0	17.0	7.9	11.8	10.7	14.0
Germany	20.2	43.1	31.3	46.6	32.2	42.3
France	5.5	11.7	8.7	12.9	11.8	15.5
United Kingdom	2.7	5.8	4.6	6.8	5.8	7.6
Sweden	3.5	7.5	3.0	4.5	3.6	4.7
Others	7.0	14.9	11.7	17.4	12.1	15.9
Total	46.9	100.0	67.2	100.0	76.2	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by OECD, based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

wholesale trade, construction, and transportation, are either insufficiently developed or too dependent on public financing and planning to be inclined to modernize the materials handling function in the immediate future.

Investments in MHE&S are being considered by manufacturing firms of all sizes. Large firms are becoming increasingly cost-conscious and deeply involved in modernizing their manufacturing and distribution processes. Small- and medium-size firms, although they do not always apply modern cost accounting techniques, recognize the part that materials handling equipment can play in maintaining or increasing their profit margins.

Most business sectors anticipate rising sales and general prosperity during the 1972-77 period. Lagging private investment represents a serious weak spot in the economy. Even so, an increasing volume of orders will be placed for materials handling equipment and systems because of the acute need to cut labor costs.

Five areas of Italian manufacturing — primary metal products, food and kindred products, electric and electronic equipment, rubber and miscellaneous plastics products, and fabricated metal products — stand out as industries actively interested in acquiring materials handling equipment and systems.

Primary metal products.—Spurred by Government-guaranteed financing and other incentives, the primary metals industry has experienced a remarkable overall expansion. Of the 590 companies in 1971 engaged in metal production, 34 had more than 1,000 employees and 42 had between 500 and 1,000 employees. Production, which totaled 18 million tons in 1972, is forecast to reach 24 million tons in 1975. A considerable share of this production will continue to be attributable to Government-controlled firms.

Future prospects for sales of materials handling equipment and systems to the primary metals industry are particularly bright, since several new plants are to be built in Italy's economically developing southern region during the next several years. Spending for materials handling equipment and systems by the metal production industry amounted to approximately $13 million in 1972 and is projected at $16 million in 1974.

The industry is adopting the continuous production line wherever feasible and is increasingly applying modern principles of warehouse organization. The primary metals industry is especially interested in American-made high-payload roller and other conveyors; high-payload cranes, derricks, and hoists; remote-controlled tractors; automated warehouse controls; and braking mechanisms for lifting and loading equipment.

The manufacture of primary metal products is one of the most important activities of Montedison, Italy's giant chemicals conglomerate. This company, which had sales of $11 billion in 1971, employs some 53,000 persons.

Montedison operates 790 forklift trucks, representing 42 different makes. One-third are older models bought more than 10 years ago. The firm reportedly is planning to replace its existing fleet with 800 new forklifts to be leased, probably from manufacturers. Once satisfactory arrangements have been agreed upon, it is thought that a second 800-vehicle fleet might be leased by Montedison's subsidiaries and affiliates.

The average payload of Montedison's present forklifts (excluding those owned by subsidiaries and affiliates) is 4.4 tons; 70% of the trucks are diesel powered, 25% are battery operated, and 5% are powered by other means.

Food and kindred products.—Italy's food processing industry includes 1,030 individual companies; each employed at least 50 persons in 1971. Ten of these enterprises employed more than 1,000 persons each, while 38 firms had between 500 and 1,000 workers.

The industry's annual sales, estimated at $172 billion in 1972, are expected to increase steadily during the next few years. Management hopes the expected production increases can be obtained through greater worker productivity, with mechanization making it unnecessary to hire additional labor. Since industry is operating at only 70% of plant capacity, it is more interested in reducing costs and raising productivity of existing plants than in constructing new production facilities.

Purchases of materials handling equipment and systems by Italy's food and kindred products industry in 1972 were estimated at $9.6 million, up slightly from $9.4 million in 1971. Industry purchases of MHE&S should reach approximately $11 million in 1974.

Companies in the food industry are increasingly interested in modern distribution networks, particularly now that food sales are rising rapidly. Moreover, they seek solutions to the inventory control problems posed by supply and demand fluctuations in raw materials and the seasonal sales of some products.

Manufacturers of frozen foods, faced with expanding demand for an ever wider variety of products, seek imported advanced transport systems that can eliminate interruptions in the freezing process.

Candy and confectionery makers, also experiencing record-high demand for their products, need storage and retrieval systems and other equipment that will permit more efficient warehouse organization.

Companies with highly diversified product lines are keenly interested in purchasing conveying equipment that is integrated with coding and decoding systems.

U.S. suppliers will find excellent opportunities to furnish Italy's food industry with special accessories for forklift trucks, automated warehouse control systems, coded lightbeam sensors, high-performance bin-level indicating systems, and in-process coding and decoding devices.

Motta SpA of Milan, one of the giants of the Italian food and kindred products manufacturing industry, had annual sales of $115 million in 1971. With two major plants and 6,000 employees, Motta is one of the industry's leading users of automated materials handling equipment and systems.

Motta spent an estimated $250,000 on MHE&S during 1971-72. The company purchased 15 forklift trucks from OM-Fiat of Italy; 10 forklift trucks from Jungheinrich of Germany; two belt conveyors made in Italy under license from Rapistan of the United States; and a fully automated and computerized warehouse, equipped with both air-conditioned and deep-freeze compartments. The equipment was supplied by a group of Italian, Dutch, German, and American manufacturers.

Motta's annual MHE&S capital budget for 1973 and 1974 is estimated at $200,000 and is likely to cover the purchase of roller and gravity conveyors, automated floor trucks, and additional forklift trucks with specialized accessories. Motta is also interested in devices that are mounted on forklift and floor trucks to open and close warehouse doors.

Electric and electronic equipment.—This sector of Italian industry contributed $2.7 billion to Italy's gross national product in 1971. Approximately 60% of this total was accounted for by consumer durables, of which Italy is one of the world's leading exporters. The remainder consisted of industrial products.

The electric and electronic equipment industry has experienced substantial growth in terms of sales, employment, and investment despite the setbacks suffered by the Italian economy in 1969-71. Growth is expected to continue at least through 1975, when production should reach $4 billion, compared with an estimated $3 billion in 1972. During the same period, capital investment should spurt from $262 million to $591 million. Spending for materials handling equipment and systems, estimated at $7.9 million in 1972, should total $9.4 million in 1974.

A look at the utilization of materials handling equipment and systems in the electronics industry reveals strong contrasts among the sector's 896 companies, including 65 with more than 1,000 employees.

The larger electronics producers — the majority of which are foreign-owned — are progressive in their use of MHE&S equipment, and smaller, competing firms tend to follow their example. The larger firms have adopted automatic on-line conveyor equipment to accelerate production and simultaneously reduce manpower requirements. Inventory-handling systems are recognized as especially efficient in keeping track of the thousands of small parts and finished products that electronics firms must stock.

American MHE&S manufacturers will find the following products among those having the highest potential for sales growth: Conveying equipment with integrated quality control; automated warehouse control systems, including computerized systems; coding and decoding devices for warehouse storage; storage and retrieval systems; and remote controls for warehouses.

Termokimik Corporation, with two factories in the Milan area, had sales of $7.6 million in 1971. This medium-size electronics firm is engaged in the engineering, production, sale, and installation of electro-technical and electronic equipment, and, for its size, is a rather sophisticated user of materials handling equipment and systems.

Termokimik annually spent approximately $45,000 on such equipment in 1971 and 1972, buying five OM-Fiat floor trucks, three Technicar Italiana hand-guided floor trucks, and three light-payload bridge cranes, all of domestic manufacture.

Termokimik's annual MHE&S budget is tentatively set at $55,000 for 1973 and 1974 and will probably be used to purchase conveyors for liquid resins integrated with resin/water mixers, additional hand-guided floor trucks, and one or two shifting units for storage of electronic components.

Termokimik is also interested in buying remote-control systems for warehouse storage and safety stopping mechanisms for conveyors.

Rubber and miscellaneous plastics.—Rubber production and processing in Italy is carried out primarily by a dozen major companies. In contrast, hundreds of small- and medium-size firms account for the bulk of the country's plastic products output. Employment in the 559 companies that comprise the two industries totaled 135,000 in 1971 and may reach 162,000 in 1975.

An estimated $562 million worth of rubber products and 1.6 million tons of plastics were produced in 1971. These values in 1975 should rise to $620 million for rubber products and 1.9 million tons of plastics.

Capital investment in the rubber industry, which amounted to $77 million in 1972, is forecast at $86 million in 1975. Trade estimates place capital investment in the plastics industry at $70 million in 1972 and $80 million in 1975.

Both the rubber and plastics products industries are important users of materials handling equipment and systems. The two industries spent $5.6 million in 1972 and may spend $6 million in 1974.

The more recently established plastics industry adopted advanced equipment at its inception, while the rubber manufacturers switched to modern MHE&S because of the extensive size of their operations. Pirelli, Italy's largest manufacturer of rubber products, is one of the country's pacesetters in terms of MHE&S usage.

Rubber and plastics manufacturers look to materials handling equipment and systems to cut production costs, especially labor costs, but also want to minimize mechanical breakdowns and maintenance costs. U.S. suppliers should find that in-process robot handling equipment, remote-controlled tractors, automated warehouse-control systems, braking mechanisms for floor-handling equipment, and palletizing and depalletizing systems are of particular interest to Italian rubber and plastics manufacturers.

The degree of sophistication of the MHE&S requirements of the typical Italian rubber or plastics manufacturer is illustrated by Superga SpA. This firm of 2,500 employees reported annual sales of $20 million in 1971.

Superga spent approximately $120,000 in 1971-72 on materials handling equipment and systems, including five OM-Fiat and seven Fenwick (France) forklift trucks; monorails and conveyors made in Italy under license from Webb B. Jervis (U.S.); electric hoists from Cleveland Crane and Engineering (U.S.); and air hoists supplied by Italian manufacturers.

Superga expects to spend $150,000 on materials handling equipment and systems during 1973 and 1974. The company is especially interested in a complete warehouse storage system with one or more shifting units, battery-operated forklift trucks with automatic control, and a system of driverless railway floor wagons to link production lines with warehouses.

Fabricated metal products.—Manufactured metal products are one of Italy's principal exports, but rising production costs threaten the industry's competitive position in the world market. Conditions are favorable for investments in materials handling equipment and systems, an area that has been somewhat neglected. MHE&S spending is forecast at $5.7 million in 1974, up from $4.6 million in 1972.

The fabricated metal products industry has started to convert to continuous assembly line operations, using pneumatic, roller, belt, chain, and wheel conveyors. Warehouses are beginning to install coding, decoding, and translator handling systems.

U.S. suppliers will find the industry interested in purchasing conveying equipment with integrated weighing devices, monorails, in-process robot handling equipment, storage and retrieval systems, and coding and decoding systems for in-process manufacturing operations.

Reggiane Officine Meccaniche Italiane (ROMI) is one of the many Italian manufacturers of fabricated metal products to recently discover the advantages offered by modern materials handling equipment and systems. ROMI's major production lines are devoted to metalworking, rolling-stock materials, and a variety of machinery. The firm has 500 workers and annual sales of $8 million.

MHE&S expenditures by ROMI in 1971-72 amounted to about $200,000 and covered the purchase of five crane bridges from DEMAG (of Germany) and 10 forklift trucks, with payloads of up to 5 tons, from OM-Fiat, CESAB SpA of Italy, and U.S. suppliers.

ROMI intends during 1973-74 to spend $160,000 on materials handling equipment and systems, including at least five electric hoists, three high-payload forklift trucks, and a storage system for metal bars and other semifinished metal products. The firm's plans for the period beyond 1974 are tentative but are likely to include significant sums for automated payload controls, braking mechanisms, and electronic controls for forklift trucks.

Competitive Environment

Although the current outlook for Italian imports of materials handling equipment and systems is clouded somewhat by economic and political uncertainties and by the strong trend in Italy toward the licensed production of foreign-designed equipment, U.S. suppliers will find that the market for advanced and automated equipment and systems is ready to be developed. Italian buyers believe American-made materials handling equipment and systems are unparalleled in quality, reliability, and long life, and customer loyalty is strong.

In 1971, some 590 firms were engaged in producing materials handling equipment and systems (including passenger elevators, equipment used primarily in mining, and similar products that are outside the scope of this survey).

An estimated 65 Italian-owned companies and several subsidiaries of foreign manufacturers produce the types of materials handling equipment and systems that are the subject of this report. Italian industry produced MHE&S valued at $166 million in 1972. Output in 1977 is expected to exceed $200 million.

FATA SpA is one of Italy's leading manufacturers of lifting, loading, and conveying equipment. This firm makes conveyors, all types of hoists, bridge cranes and other cranes, storage systems, computer-controlled warehouse equipment, and other items, mainly for Italy's larger corporations. FATA has an agreement with DEA, of France, under which FATA may draw on DEA's electronics technology.

Pianelli & Traversa manufactures conveyor installations and other handling equipment suited for larger factories under license from Webb B. Jarvis. Its business volume has risen rapidly, mainly because of its sales to Fiat.

Comubra Lamsat makes storage systems, including vertical systems with manual, semiautomatic, and automatic controls. The firm also produces monorails, chain conveyors and, under license from Simplex (U.S.), materials handling robots for on-line applications. Another firm, Cisa Italo-Svizzara, includes integrated warehouse systems in its line of storage systems and related equipment.

OM-Fiat is Italy's largest producer of forklift trucks, accounting for 4,500 units, or 50% of 1971 domestic sales of forklifts. OM's size, and that of its parent corporation, enable OM to market its products more aggressively than other domestic manufacturers and to offer long-term credit and superior after-sale service.

CESAB SpA is Italy's second largest forklift truck manufacturer, producing approximately 700 units per year and enjoying an excellent reputation for quality. Other major producers are Berzoini SpA (600 forklifts annually) and Carrelli Electtrici Tansini and Miletto (400 each). Bolzoni and Officina Meccanica Sestese manufacture forklift accessories.

Italian-made materials handling equipment has met with wide acceptance on the world market, principally among the less-developed countries that are primarily interested in basic equipment. Italy's exports of materials handling equipment totaled $116 million in 1972. Prospects for future exports are reduced, however, by the terms of recent labor contracts which threaten to decrease Italy's price competitiveness.

Twenty-four American and 44 other foreign suppliers of materials handling equipment and systems are represented in the Italian market.

German firms lead the list of "other foreign" suppliers, with 22 companies represented. Demag offers the most complete line of materials handling equipment of any German firm represented in Italy, but Siebau (storage and retrieval), Jugheinrich (industrial vehicles), Fromme Foderanlagen (chain conveyors), and Transport Anlagen (small conveyors) also are strong.

Italian customers buy forklift trucks made in Germany by IWS Industriewerke, Linde A.G., PHB, SE Esslingen, Sichelschmidt C W, Steinbock GmbH, Still A.G., and Zenith of Maunkirchen.

Several British MHE&S suppliers are active in the Italian market. They include Bonser Engineering, Henley Forklift, Matbro Sales, Ltd., and Lancer Boss, Ltd., producers of diesel- and gasoline-powered forklift trucks; Clenco Electric Industries and Lansing Bagnall, manufacturers of other types of powered trucks; Coles Cranes, Ltd., a maufacturer of self-propelled cranes; and Dexion Overseas, Ltd., a producer of chain conveyors.

Six major French MHE&S manufacturers are represented in Italy, including Appalette Ş.A. (conveyors); Magromover (air-cushion handling equipment); Teleflex (conveyors and other equipment); and Braud & Faucheux, Matral, and Salev S.A., all manufacturers of forklift trucks.

The duties charged on most materials handling equipment and systems (tariff classifications BTN 84.22 and 87.07) imported from the United States and other nonmembers of the European Economic Community range from 5.5 to 9%. In addition, a value-added tax of 12% is levied on all imports, as well as on equipment of domestic manufacture. Import licenses must be obtained from the Ministry for Foreign Commerce for trucks and parts classified under BTN 87.07.

Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-232), U.S. Department of Commerce, Washington, D.C. 20230.

Technical Requirements

The characteristics of Italy's electric power supply are 200 volts, 50 hertz, single-phase. In many parts of the country, 380-volt, 50 hertz, 3-phase current is used in industry. Italy uses the metric system of weights and measures exclusively.

Domestic manufacturers of MHE&S adhere to the standards established by UNI and applied by the National Association of Mechanical and Allied Industries (ANIMA). Materials handling equipment and systems intended for sale in Italy must also meet the conditions set forth in the Ministerial Decree of September 12, 1959, and Presidential Decree No. 547 of April 27, 1955.

The provisions of the ministerial decree, which concern general standards, tests, and inspections, pose no problem to American MHE&S suppliers. Decree No. 547 deals with equipment safety and contains provisions that are somewhat more stringent than comparable U.S. regulations.

Detailed information on technical requirements may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

Official statistics of the U.S. Bureau of Census annual publication, *Exports, Commodity by Country,* FT-410, show in detail on the following page U.S. exports of materials handling equipment to Italy in selected years.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

"The Market for Materials Handling Equipment and Systems in Italy," DIB 00-00-000, March 1973.

Table 3.—U.S. exports to Italy of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	—	—	647	2,658
Parts for above	92	69	604	134
Other cranes, unmounted	1,060	1,989	1,669	3,170
Other crane parts	616	103	125	64
Subtotal, cranes and parts	1,768	2,161	3,045	6,026
Hoists	110	57	169	110
Parts for hoists	116	20	13	39
Derricks	—	—	90	—
Winches	36	155	84	66
Parts for above, etc.	998	695	544	144
Hydraulic jacks, parts	63	53	53	53
Other jacks and parts	64	5	19	—
Other lifting equipment	288	251	3,591	990
Subtotal, lifting equipment	1,675	1,236	4,563	1,402
Elevators, escalators	9	13	6	—
Parts for above	24	29	40	17
Gravity conveyors	—	4	—	—
Overhead conveyors	42	1	—	—
Pneumatic conveyors	347	103	79	—
Wheeled conveyors	14	1	—	—
Other conveyors	187	378	398	715
Parts for conveyors	240	250	212	317
Subtotal, conveyors and parts	863	779	735	1,049
Used and rebuilt tractor shovel loaders (TSL)	256	36	—	96
Front-end loaders for mounting on TSL	—	—	7	—
Subtotal, loaders and used TSL	256	36	7	96
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	41	100	—	—
4-wheel drive, -1	—	—	43	21
4-wheel drive, 1-1.49	48	36	23	—
4-wheel drive, 1.5-1.99	268	87	15	—
4-wheel drive, 2-2.49	265	5	68	94
4-wheel drive, 2.5-3.49	221	84	—	—
4-wheel drive, over 3.5	808	1,654	1,427	1,810
Subtotal, wheeled TSL	1,651	1,966	1,576	1,925
Total, lifting, loading, and conveying	6,213	6,178	9,926	10,498
Industrial vehicles (IV)				
Walking and powered IV	—	4	—	—
Electric-powered IV	2	15	14	112
Gasoline-powered IV	17	209	145	—
Other-powered IV	78	264	120	561
Portable stackers	2	11	1	—
Parts for above	880	525	141	155
Total, industrial vehicles	979	1,028	421	828
Total, materials handling equipment	7,192	7,206	10,347	11,326
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng. hp	—	—	—	—
45-59.9 eng. hp	—	—	—	—
60-89.9 eng. hp	19	—	9	—
Over 89.9 eng. hp	430	414	179	993
Subtotal, tracklaying TSL	449	414	188	993
Underground loaders	9	131	69	71
Parts for above	17	45	43	49
Oil fld. rod-lift equipment	1	—	1	—
Oil fld. derrick, pts.	255	1	2	816
Other oil fld. lift equipment	35	67	19	59
Farm elevators	5	—	1	—
Parts for farm elevators	—	—	2	—
Automobile lifts	—	—	—	—
Underground mine conveyors	9	—	—	—
Subtotal, other equipment	331	244	137	995
Total, tracklaying and other equipment	780	658	325	1,988
Grand total, mechanical handling equipment	7,972	7,864	10,672	13,314

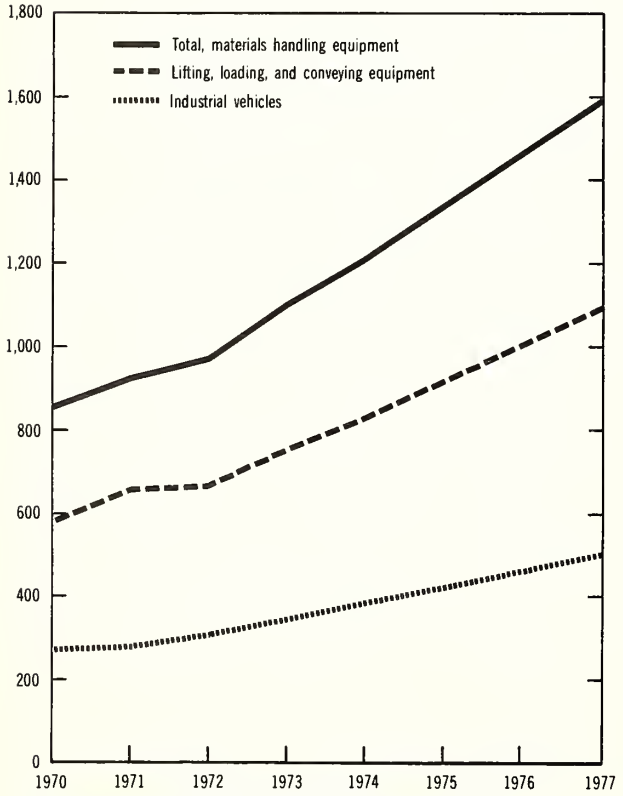
Source: Exports, Commodity by Country, FT-410—1969, 1970, 1971, and 1972. U.S. Department of Commerce, Bureau of the Census.

Japan

Japanese industry has turned to the use of materials handling equipment and systems (MHE&S) to help offset mounting labor costs that surged more than 30% in 1971 and 1972. In spite of an economic recession in 1971, the Japanese market for materials handling equipment increased 14.4% during the 1970-72 period, with sales rising from $851 million to $972 million (see table 1).

Japan: Size of market for materials handling equipment, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: U.S. Department of Commerce, Office of International Marketing market research, official Japanese statistics, and trade estimates.

As the economy continues to recover from the recession, 1973 sales are expected to show a 13.5% increase over the 1972 level, marking the return to accelerated growth in the MHE&S market. The Japanese materials handling equipment market is expected to increase by 65% from 1972 to 1977, when sales are forecast at $1.6 billion.

The markets for lifting, loading, and conveying equipment and for industrial vehicles are expected to grow at an average rate of 10% during the 1972-77 period. Japanese expenditures for lifting, loading, and conveying equipment, valued at $578.5 million in 1970 and $667.4 million in 1972, are expected to approach $1.1 billion in 1977.

In that same year, the market for industrial vehicles should reach $500 million. Purchases of industrial vehicles reached $272.7 million in 1970 and $305 million in 1972.

The Japanese materials handling equipment industry is producing technologically advanced equipment and is offering stiff competition to foreign exporters. Between 1970 and 1972, the value of imported MHE&S dropped from $31 million to just over $25 million and is expected to level off at $15 million by 1977. Lifting, loading, and conveying equipment is expected to represent approximately 95% of total MHE&S imports during the 1973-77 period, while industrial vehicles should maintain their current share.

Despite forecasts of a shrinking Japanese import market, the United States is expected to increase its sales to Japan during the 1972-77 period. U.S. exports of mechanical handling equipment rose from $13.9 million in 1969 to $20.3 million in 1971,

Table 1.—Japan: Size of market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	622.0	706.1	774.9
Imports	30.0	29.5	24.5
Exports	73.5	79.7	132.0
Market size[2]	578.5	655.9	667.4
Industrial vehicles			
Production	313.7	322.9	368.1
Imports	1.0	.7	.8
Exports	42.0	52.9	63.8
Market size	272.7	270.7	305.1
Totals, materials handling equipment			
Production	935.7	1,029.0	1,143.0
Imports	31.0	30.2	25.3
Exports	115.5	132.6	195.8
Market size	851.2	926.6	972.5

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[1] Bureau of International Commerce estimates based on market research..

[2] Market size equals production plus imports minus exports.

Source: Production values based on data from *Japan Machinery Production Statistics*, published March 1973. Foreign trade values based on data from *Japan Exports and Imports Statistics*, published by the Ministry of Finance, March 1973.

earning American firms a 65.7% share of the import market (see table 2). In addition to earnings from equipment sales, many U.S. MHE&S manufacturers obtain substantial income through joint ventures, patent sales, and licensing agreements with Japanese firms. The sale of components through such cooperative arrangements is expected to grow as a result of more realistic exchange rates between the yen and the dollar.

All major foreign competitors have experienced decreasing sales to Japan since 1970. France ranked a distant second to the United States in 1971, with exports to Japan totaling $3.4 million, representing an 11% market share. Among other suppliers in that year were Germany, with sales of $2.2 million (7.1%); Sweden, $2 million (6.5%); and the United Kingdom, $1.1 million (3.6%).

Specific Sales Opportunities

A market research study recently conducted in Japan for the U.S. Department of Commerce indicates favorable sales opportunities for American manufacturers of the following products:

Lifting, Loading, and Conveying Equipment

- Gravity conveyors
- Cranes with load control devices
- Crane parts
- Tractor-shovel loaders

Industrial Vehicles

- Electronically-controlled forklift trucks
- Parts for industrial vehicles

Systems and Specialized Equipment

- Automated storage and retrieval equipment
- Coded lightbeam sensors
- High-speed sorter systems
- Belt-conveyor systems with image-recognition devices
- Warehouse control timers
- Computer-controlled conveyors and cranes

Lifting, loading, and conveying equipment. — Sales of lifting, loading, and conveying equipment account for nearly 70% of the total Japanese MHE&S market. Exports of gravity conveyors exceeded $150,000 in 1972, a tenfold increase over 1969 levels, and Japanese end-users have continued to express interest in these U.S. products. U.S. exporters should also find a good market for cranes with mechanisms that warn the operators of approaching maximum load capacity and for conventional crane parts.

U.S. exports of tractor-shovel loaders to Japan rose from $2.4 million in 1969 to $6.7 million in 1972, with those having bucket capacities of over 3.5 cubic yards accounting for $4.5 million of this. Two-wheel drive tractor-shovel loaders have also presented good sales opportunities to U.S. manufacturers, with exports valued at $346,000 in 1972.

Tractor-shovel loaders with four-wheel drive and of 2- to 2.49-cubic-yard bucket capacities accounted for $193,000 in exports from the United States in 1972, and used or rebuilt tractor-shovel loaders accounted for $150,000.

Industrial vehicles.—The market for industrial vehicles in Japan is supplied almost exclusively by domestic manufacturers. With the market for such vehicles increasing significantly, however, prospects for U.S.-made industrial vehicles could show radical improvement as a result of currency realignments. Electronically-controlled forklift trucks, for example, offer a good opportunity for U.S. companies because the Japanese have only recently begun to manufacture such trucks and production still is not sufficient to meet demand. Furthermore, because of high tooling costs and production time lags, the demand for imports of electronically-controlled forklifts should continue to be strong for some time, even though Japanese domestic producers are expected to respond to shifting patterns of demand by adapting their products to meet end-user requirements. The market for parts for industrial vehicles is rising steadily, with U.S. sales of these items increasing more than threefold from $87,000 in 1970 to nearly $300,000 in 1972.

Systems and specialized equipment.—The best sales opportunities for U.S. suppliers of MHE&S are found in the market for systems and specialized equipment. Rapidly rising labor costs and the high technological level of Japanese industry should stimulate increases in Japanese purchases of U.S.-made precision control systems and computer-controlled systems and equipment. Japanese end-users recognize the superiority of U.S. technology in this field. With lower landed costs resulting from the dollar devaluation, U.S. firms are assured of a good market for automated storage and retrieval equipment.

The total Japanese market for automated warehouses that incorporate such systems is expected to reach $385 million in 1975. These warehouses are expected to provide significant sales opportunities for U.S. manufacturers of automated high-density storage and retrieval equipment combined with computerized inventory and accounting systems. Computerized cranes and conveyors are expected to be important elements of these systems.

Japanese manufacturers who require precise control over the quantity and quality of their products are purchasing belt conveyors for production lines that include image-recognition devices used for counting and analyzing the articles conveyed for missing parts as well as for proper size and weight. Japanese manufacturers also have shown considerable interest in specialized and custom-designed high-speed sorting systems capable of handling a variety of sophisticated functions.

Other specialized equipment that offers a good market opportunity for U.S. suppliers includes coded lightbeam sensors designed to enable forklift trucks to open and close warehouse doors and various types of special timers for warehouse controls.

Japanese suppliers readily adapt to changes in demand and will continue to supply at competitive prices most equipment that is sold in quantity. Best prospects for U.S. suppliers should exist for the most advanced and specialized equipment, which in many cases must be custom-designed to end-user specifications. However, U.S. manufacturers will have to remain in the technological vanguard in order to ensure continued exports of materials handling equipment and systems to Japan.

End-User Analysis

The Japanese economy is currently experiencing unprecedented growth. The 1973 real gross national product (GNP) is expected to increase 12% over 1972 levels. In the face of increasing labor costs, however, the continued growth of the Japanese economy depends on further automation in the manufacturing and wholesale trade industries. Japan's major industries therefore are expected to lead in the application of advanced materials handling equipment and systems.

Approximately 18% of the total industrial investment in Japan is earmarked for purchases of materials handling and distribution systems, according to a 1971 survey of 282 of Japan's largest companies. The survey, taken by the Japan Development Bank, showed that the average annual increase in investment is 7% in manufacturing industries and 40% in nonmanufacturing industries. Of the five

Table 2.—Exports of mechanical handling equipment to Japan by principal suppliers, 1969-71
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States [1]	13.9	61.8	23.3	60.1	20.3	65.7
France	1.3	5.8	4.3	11.1	3.4	11.0
Germany	1.9	8.4	2.7	6.9	2.2	7.1
Sweden	1.4	6.2	4.2	10.8	2.0	6.5
United Kingdom	1.5	6.7	1.4	3.6	1.1	3.6
Others	2.5	11.1	2.9	7.5	1.9	6.1
Total	22.5	100.0	38.8	100.0	30.9	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities,* Series C, Volume III, 1969, 1970, and 1971, published by the Organization for Economic Cooperation and Development (OECD), based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

principal MHE&S end-user sectors, four are in manufacturing: iron and steel, electrical machinery, nonelectrical machinery, and transportation equipment. The fifth major MHE&S user is the wholesale trade. Total capital investment by the five sectors amounted to $8.2 billion in 1972, with investment in MHE&S totaling $370 million.

Iron and steel.—The value of production of the 7,200 Japanese iron and steel manufacturers reached $14.4 billion in 1969. Average annual growth in output is forecast at about 9.4% for the 1972-77 period, and capital investment, estimated at $2.9 billion in 1972, is expected to reach $4.1 billion by 1974.

Japanese iron and steel firms employ advanced materials handling techniques wherever possible, incorporating custom-designed systems into their plants at the time of construction and utilizing that equipment until it becomes obsolete. The value of investment in materials handling equipment and systems by this industry was $87.9 million in 1972 and is expected to reach $121.7 million by 1974.

Some of the principal materials handling products include conveyors of various types, cranes, hoists, industrial vehicles, and storage and retrieval systems. Plans call for the use of more computer-controlled materials handling equipment.

The Nippon Steel Corporation of Tokyo, one of the world's major manufacturers of iron and steel, invested an estimated $423 million in equipment in 1973, primarily for construction of new blast furnaces at its plants in Ooita and Kimitsu. Other major investments include a new plant and modernization of the main blast furnace at Tobata, as well as a new steel mill and bar steel mill to be built at Sakai. The most modern materials handling equipment and systems, including remote-controlled iron or steel handling systems, remote-controlled vehicles, and computerized thickness-control systems, will be utilized in these plants.

Electrical machinery.—Total production of the 23,000 firms manufacturing electrical machinery in Japan reached $16.3 billion in 1969. The value of production in this sector is projected to grow at an average annual rate of about 12% and should approach $25.5 billion in 1973. Electrical machinery manufacturing enterprises spent almost $1 billion on capital improvements in 1972 and are expected to invest $1.4 billion in 1974. Investment of $54 million in materials handling equipment is anticipated in 1974, representing a 40% increase over the 1972 level of $39 million.

Electrical machinery manufacturers are closely following the developments of pattern recognition technology and are interested in fully automated warehouses capable of storing and retrieving large numbers of different articles.

Hitachi, Ltd., is one of Japan's largest manufacturers of electrical machinery. This company has announced plans to move three of its factories from the crowded Tokyo-Yokohama urban area to rural settings. The company plans to spend $115 million on the relocation project and will utilize the most advanced materials handling equipment and systems available.

Nonelectrical machinery.—Aggregate production of Japan's 42,000 non-electrical machinery manufacturers was valued at $13.8 billion in 1969 and is expected to increase at an average annual growth rate of 12%. Total capital investment by the industry amounted to $667 million in 1972 and is projected to reach $933 million in 1974. Investment in materials handling equipment and systems is expected to increase by almost 18% annually from 1972 through 1974, rising from $26.7 million to $37 million in that period. The greatest demand will be for computer-controlled handling systems to replace manual operations.

Komatsu, Ltd., Tokyo, is representative of Japan's general machinery manufacturing companies. This manufacturer of diversified machinery plans to invest $38 million during the next 6 years on a new plant at the former U.S. naval base at Yokosuka, where advanced materials handling systems will be employed.

Transportation equipment.—The transportation equipment manufacturing industry is one of Japan's largest. Approximately 17,100 firms produced transport equipment valued at $16.9 billion in 1969, and production is currently growing at an annual rate of 12%. Investment in capital improvements, which stood at $2.2 billion in 1972, is expected to exceed $3 billion in 1974. Total investment in MHE&S was $195 million in 1972 and is forecast to exceed $308 million in 1974, representing an average growth rate of 26% a year.

The most dynamic sector of the industry is automobile manufacturing. Over 4 million passenger cars were produced in 1972, representing an 8.2% increase over the 1971 level.

Materials handling equipment utilized in the transportation industry includes hoists, cranes, industrial vehicles, and storage and retrieval systems. This industry introduced the use of belt conveyors to Japan, and their use is still widespread. End-users are expected to show great interest in all types of advanced materials handling equipment, especially computer-controlled systems.

The Nissan Motor Company, Ltd., located in Tokyo, is among the world's largest automobile manufacturers. Nissan in 1973 expects to invest about $288 million in new equipment and $215 million in the expansion and modernization of production equipment and facilities. A similar level of investment is expected to continue in 1974.

Toyota Motor Company, Ltd., Tokyo, Japan's other giant automobile manufacturer, plans to invest about the same amount in new equipment. These two firms will be the primary purchasers of materials handling equipment in the transportation equipment manufacturing sector.

Wholesale trade.—Total sales by the wholesale trade industry in Japan were estimated at $170 billion in 1968. Of the 256,000 wholesale firms in Japan, over 70% are small interprises with fewer than 10 employees each. Total capital investment by wholesalers amounted to almost $1.5 billion in 1972 and is forecast to reach $2.3 billion in 1974.

Investments in materials handling equipment and systems totaled $22 million in 1972 and should increase at an average annual rate of 24%, rising to $34 million in 1974.

The wholesale sector is the primary end-user of automated warehouses in Japan. Wholesale firms are continuing to invest heavily in automatic storage and retrieval systems as a means of reducing extremely high distribution costs that result in part from the high cost of labor. Computer-controlled equipment is becoming increasingly important as the industry attempts to standardize its purchasing, warehousing, sales, billing, and delivery systems.

Characteristic of large wholesale concerns is the R. K. Mizuno Sporting Goods Co., Ltd., Japan's largest wholesaler of sporting goods. This company plans to spend $5.8 million on a new storage and distribution center near its head office in Tokyo that will include advanced materials handling equipment. Other wholesale enterprises that are prospective customers of U.S. exporters include C. Itoh & Co., Ltd., the Marubeni Corp., and the Dai'ei, Inc., all in Osaka; and Mitsui & Co., Ltd., and the Mitsubishi Corporation, both in Tokyo.

Competitive Environment

Japan's production of materials handling equipment was valued at $1.1 billion in 1972, making the industry the third largest in the world, only slightly behind the German industry. The leading producer is the United States, with production of over $2.5 billion in 1972.

Japanese production is expected to grow at an average annual rate of 11% to almost $2 billion by 1977. Over 60 major Japanese firms manufacture lifting, loading, and conveying equipment, and more than 20 companies produce industrial vehicles. Although most of domestic production supplies local markets, 17% was exported in 1972.

Despite the revaluation of the yen, exports of lifting, loading, and conveying equipment recorded a 65% increase in 1972 and exports of industrial vehicles increased 20%. As the full effects of currency realignments are felt, export sales should level off and maintain an average annual growth rate of about 12% during the 1972-77 period.

Competition among Japanese manufacturers of materials handling equipment and systems is based largely on price and product differentiation. Many firms rely on licensing and know-how agreements with U.S. firms to obtain a technological advantage over their domestic competitors.

Among Japan's leading manufacturers of materials handling equipment are Toyo Kanetsu K.K., producers of conveyors; Ishikawajima-Harima Heavy Industries Co., Ltd., cranes and storage and retrieval systems; and Ohkura Yusoki K.K., conveyors and storage and retrieval systems. Other important manufacturers of conveyors include the Sanki Engineering Co. and the Tsubakimoto Chain Co. K. K. Kamiuchi Denki Seisakusho is a major hoist manufacturer, and the Nippon Crane Works, Ltd., produces cranes. Storage and retrieval equipment manufacturers include Murata-Vidmar Co., Ltd., Nippon Filing, Nippon Niyakuohin, and Seibu Denki Kogyo K.K. Japan's leading industrial vehicle producers are Toyoda Automatic Loom Works, Ltd.; the Toyo Umpanki Co., Ltd.; and the Komatsu Forklift Co., Ltd.

Since the introduction of the first conveyor into Japan, foreign firms have assisted in the development of local industry. Subsidiaries of foreign firms are rarely found in Japan, however, because Japanese laws have discouraged such investment until recently.

Among the U.S. firms with cooperative agreements with Japanese producers are Jervis Webb, S. Y. Handling, Economation, Food Machinery Corp., Busse Brothers, Salwasser, Litton Industries, Aerojet General Corp., Kornylak Corp., Speaker Sorter, Yale, and Clark. Important German firms with similar arrangements include Stein and Holstein & Kapper. Others are Bulgaria's Balkancar, Switzerland's Vidmar, and Leel and Trans Rabo Systems of France.

Among the principal U.S. suppliers to the Japanese market are the Alliance Machine Co.; Rapistan, Inc.; Square D. Co.; Identicon Corp.; Kysor Industrial Corp.; and Power Krawler Products, Inc. Exporters from other countries include Binder Co. (Austria, conveyors); Joseph Bradbury and Sons, Ltd. (U.K., elevators); and Cable Belt, Ltd. (U.K. belt conveyors). Three Swedish firms, HIAB-FOCO AB, Linden Alimak AB, and ASEA, provide cranes, hoists, and winches.

General Agreement on Tariff and Trade (GATT) duties apply to U.S. exports to Japan. The GATT duties on materials handling equipment average 6% on lifting, loading, and conveying equipment and range from 6 to 8% on industrial vehicles. Recent Government liberalization of restrictive import duties and regulations has opened the Japanese market to

Table 3.—U.S. exports to Japan of materals handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	12	231	86	—
Parts for above	10	60	143	31
Other cranes, unmounted	432	2,330	2,811	67
Other crane parts	86	430	96	612
Subtotal, cranes and parts	540	3,051	3,135	710
Hoists	544	374	186	282
Parts for hoists	41	34	13	40
Derricks	—	—	—	—
Winches	1,010	913	1,258	278
Parts for above, etc.	6,098	9,779	6,306	2,006
Hydraulic jacks, parts	247	175	107	91
Other jacks and parts	167	98	77	88
Other lifting equipment	251	456	471	366
Subtotal, lifting equipment	8,358	11,829	8,418	3,151
Elevators, escalators	68	49	54	71
Parts for above	27	96	50	74
Gravity conveyors	15	—	33	151
Overhead conveyors	3	1	9	—
Pneumatic conveyors	93	8	25	—
Wheeled conveyors	—	1	—	—
Other conveyors	358	329	962	293
Parts for conveyors	599	959	570	341
Subtotal, conveyors and parts	1,163	1,443	1,703	930
Used and rebuilt tractor shovel loaders (TSL)	6	87	26	150
Front-end loaders for mounting on TSL	91	18	1	—
Subtotal, loaders and used TSL	97	105	27	150
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	208	184	56	346
4-wheel drive, -1	—	14	—	35
4-wheel drive, 1-1.49	—	—	20	76
4-wheel drive, 1.5-1.99	15	—	18	—
4-wheel drive, 2-2.49	26	140	99	193
4-wheel drive, 2.5-3.49	138	283	1,139	—
4-wheel drive, over 3.5	1,813	3,922	4,171	4,483
Subtotal, wheeled TSL	2,200	4,543	5,503	5,133
Total, lifting, loading, and conveying	12,358	20,971	18,786	10,074
Industrial vehicles (IV)				
Walking and powered IV	27	4	—	—
Electric-powered IV	7	2	38	—
Gasoline-powered IV	85	64	36	57
Other-powered IV	25	—	60	110
Portable stackers	—	1	34	59
Parts for above	125	87	192	293
Total, industrial vehicles	269	158	360	519
Total, materials handling equipment	12,627	21,129	19,146	10,593
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng. H.P.	—	348	435	199
45-59.9 eng. hp	137	186	195	—
60-89.9 eng. H.P.	7	—	—	26
Over 89.9 eng. H.P.	—	892	479	1,207
Subtotal, tracklaying TSL	144	1,426	1,109	1,432
Underground loaders	—	—	—	—
Parts for above	—	2	—	—
Oil field rod-lift equipment	—	1	3	—
Oil field derrick, parts	420	730	4	85
Other oil field lift equipment	716	30	16	34
Farm elevators	5	1	14	—
Parts for farm elevators	—	12	1	—
Automobile lifts	8	4	10	15
Underground mine conveyors	—	—	—	—
Subtotal, other equipment	1,149	780	48	134
Total, tracklaying and other equipment	1,293	2,206	1,157	1,566
Grand total, mechanical handling equipment	13,920	23,335	20,303	12,159

previously excluded imports. Future liberalization of restrictions on imports of computers should be of specific interest to U.S. producers of computerized materials handling systems.

Information on specific duty rates can be obtained from the Domestic and International Business Administration (DIBA-232), U.S. Department of Commerce, Washington, D.C. 20230.

There are no standard payment terms for sales transactions to Japanese importers, but import payments extending beyond 180 days require Government approval. The general practice between Japanese end-users and importers requires a down payment of 20 to 30% with the order on purchases exceeding $200,000 and monthly installment payments over a 1- to 2-year period. Interest rates on unpaid balances range from 7 to 8% per year.

Japanese firms can lease general-purpose materials handling equipment, but leasing companies do not generally offer specialized or complex MHE&S. In some cases, operators are provided for the equipment.

Because of the serious shortage of qualified personnel, foreign suppliers generally need to train their own staff or use the staff of importers to ensure proper technical support for sales and service operations. End-users emphasize the importance of efficient after-sales service as one of the primary features of good supplier-customer relations and as a prerequisite to increasing U.S. sales. Technical and sales personnel should be knowledgeable regarding the compatibility of their firm's products with those of their competitors because many Japanese end-users combine products of one company with those of another.

The warranty varies with the type of equipment, although MHE&S suppliers generally assume greater responsibility than manufacturers of many other products. Warranties for lifting, loading, and conveying equipment usually run from 1 to 2 years, including labor and parts. The general warranty period is 6 months to 1 year for industrial vehicles and includes labor only.

Technical Requirements

U.S. safety standards for cranes and similar products normally are not acceptable in Japan. The standards to be followed are outlined in "Safety Standards of Cranes and Similar Products," published by the Japan Crane Association, Shin Chiyoda Bldg., 3-4-4, Uchikanda, Chiyoda-ku, Tokyo, Japan. Detailed information regarding technical standards may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

Electric power supply is generally 100/200 volts, 50 hertz in the Kanto area (including Tokyo and Eastern Japan) and 100/200 volts, 60 hertz for the area west of the Fuji River and for most other parts of the country. The metric system of weights and measures is used.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

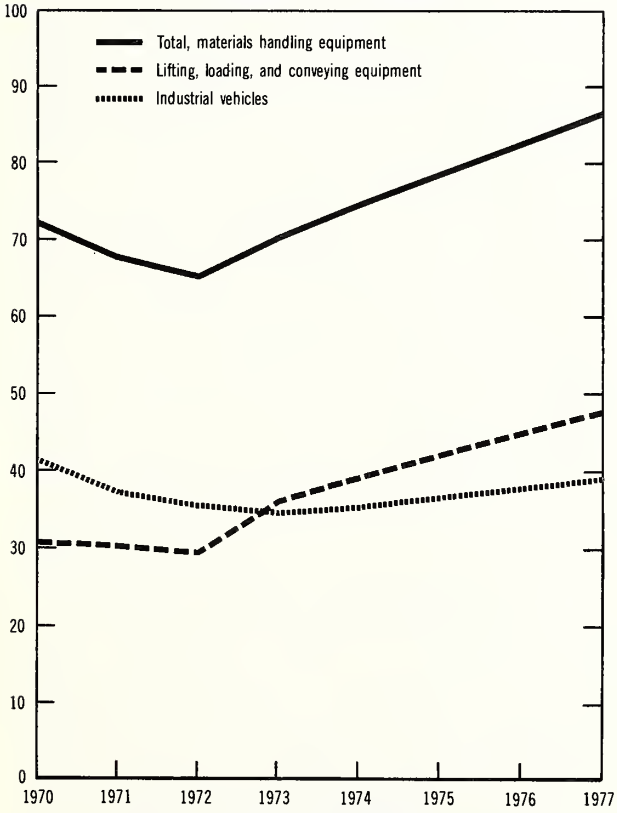
"The Market for Materials Handling Equipment and Systems in Japan," DIB 73-12-501, April 1973.

Mexico

Mexico's rapidly developing industrial sector is turning to advanced materials handling equipment and systems (MHE&S) to increase productivity. Since the 1960's, there has been a perceptible change in the attitude of management, which is now more receptive to the cost-saving benefits of mechanization. The country's MHE&S market is expected to reach $86 million in 1977, rising from an estimated 1972 level of $65 million and representing an average annual growth rate of almost 6% (see table 1).

Mexico: Size of market for materials handling equipment, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: U.S. Department of Commerce, Office of International Marketing market research, official Mexican statistics, and trade estimates.

Sales of lifting, loading, and conveying equipment approached $30 million in 1972 and are expected to climb to over $47 million in 1977, for an average annual growth rate of almost 10%. A more moderate rise is forecast in the market for industrial vehicles. Mexican purchases of industrial vehicles amounted to $35 million in 1972. They should total $39 million in 1977, representing a 10% increase for the 5-year period.

Mexico depends on foreign suppliers, particularly the United States, its most important trading partner, to satisfy over one-third of its requirements for materials handling equipment and systems. Total imports were valued at $26 million in 1972. The level of imports should rise slightly by 1977, reaching $28 million.

U.S. exports to Mexico of *mechanical* handling equipment reached over $16 million in 1971, for a market share of almost 69% (see table 2). U.S. firms are expected to continue to supply about 60% of the country's mechanical handling import market between 1972 and 1977, and U.S. exports in 1977 are forecast at nearly $17 million.

Germany was Mexico's second largest foreign supplier of mechanical handling equipment in 1971 with $2.2 million in exports for a market share of 9.2%. The United Kingdom's exports to Mexico declined from $4.6 million in 1970 to $1.1 million in 1971, representing 4.6% of the import market market in 1971. Other important foreign suppliers of mechanical handling equipment to Mexico in

Table 1.—Mexico: Size of market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	22.4	20.4	19.9
Imports	10.4	11.2	11.0
Exports	2.3	1.4	1.2
Market size[2]	30.5	30.2	29.7
Industrial vehicles			
Production	25.0	22.0	21.0
Imports	17.0	16.0	15.0
Exports	.8	.7	.6
Market size	41.2	37.3	35.4
Totals, materials handling equipment			
Production	47.4	42.4	40.9
Imports	27.4	27.2	26.0
Exports	3.1	2.1	1.8
Market size	71.7	67.5	65.1

[1] Bureau of International Commerce estimates based on market research.
[2] Market size equals production plus imports minus exports.
Source: Production values based on Mexican trade source data. Foreign trade values based on data from *Anuario Estadistico del Comercio Exterior de los Estados Unidos Mexicanos,* published by the Secretariat of Industry and Commerce.

1971 include Switzerland with $1 million in exports and France with $900,000.

Specific Sales Opportunities

In a market research study recently conducted in Mexico for the U.S. Department of Commerce, the following products were identified as having favorable sales potential for American manufacturers:

Lifting, Loading, and Conveying Equipment
- Belt conveyors
- Chain conveyors
- Roller conveyors
- Screw conveyors
- Bridge cranes
- Jib cranes
- Pillar cranes
- Derricks
- Elevators
- Hoists
- Industrial monorails

Industrial Vehicles
- Platform trucks
- Forklift trucks
- Front-end loaders
- Tractor-shovel loaders

Systems and Specialized Equipment
- Load-controlling systems
- Palletizing and depalletizing systems
- Vibrating feed systems.

Lifting, loading, and conveying equipment.—Of the three subcategories of MHE&S, lifting, loading, and conveying equipment offers the best potential sales opportunities for foreign suppliers. U.S. firms, in particular, are favored because of the superior design and proven reliability of their products. Mexican firms also appreciate the fact that American exporters generally provide a more complete line of spare parts than other foreign suppliers.

U.S.-made pushbutton-operated hoists, both electric and pneumatic, are in demand in Mexico because of their advanced features. Several large Mexican manufacturing plants have already installed industrial monorails, and the possibilities for sizable future sales are good for U.S. manufacturers. Cranes and conveyors should offer good sales opportunities to U.S. suppliers.

Industrial vehicles.—Forklift trucks in the 2,000- to 12,000-pound range and platform trucks are used extensively by Mexican industrial firms. Special types of forklift trucks and platform trucks will continue to be imported, while the more standard types will be supplied primarily from local sources.

American manufacturers should find an excellent market in Mexico for industrial tractors. In particular, front-end loaders and integral tractor-shovel loaders will be required. U.S. producers lead in supplying this market. They have established a good reputation for superior equipment design, structural soundness, and marketing services that should make their success in the future easier.

Systems and specialized equipment.—Historically, local manufacturers have been reluctant to introduce automated systems because wage rates in Mexico are relatively low. This attitude is changing, however, as industrial units become larger and as labor costs increase. Consequently, the Mexican market for systems and specialized equipment will grow steadily throughout the remainder of the 1970's. A few of the country's leading industries have already invested in specialized handling systems. Steel mills in northern Mexico, for example, are presently experimenting with local control and positioning equipment. The Government oil combine, Petroleos Mexicanos, has automated a number of plants in several of its refineries. Special equipment for load controlling, palletizing and depalletizing, and vibrating feed should offer the best sales potential in the 1972-77 period.

End-User Analysis

Prime Mexican customers for materials handling equipment, particularly advanced systems, are the large industrial concerns, many of which are affiliated with U.S. companies. The dynamic chemical sector is expected to become the largest MHE&S user in the country and should account for about 20% of total purchases in 1973 and 1974. Mexico's food and related products sector is another large consumer of MHE&S. The sector's purchases of imported materials handling equipment and systems in 1974 are anticipated to account for 30% of the total import market.

Factors affecting the Mexican MHE&S market include the overall economic condition of the country, the cost of labor, and the attitudes of management toward the use of materials handling equipment and systems. Record sales of MHE&S were reported in 1970, when Mexico's gross domestic product (GDP) rose by 7.6%. The following year, when the GDP grew by only 3.7%, purchases of MHE&S decreased, reflecting the less favorable economic conditions. Consumption of MHE&S during the 1973-77 period is expected to rise as the annual economic growth rate returns to 7%. Rising wage rates could induce managers to substitute MHE&S for labor to cut the cost of production and increase productivity.

Table 2.—Exports of mechanical handling equipment to Mexico by principal suppliers, 1969-71 [1]

(in millions of U.S. dollars)

	1969		1970		1971	
	Value	Mkt. Share Pct.	Value	Mkt. Share Pct.	Value	Mkt. Share Pct.
United States	14.8	57.6	16.4	58.8	16.4	68.6
Germany	1.8	7.0	2.3	8.2	2.2	9.2
United Kingdom	3.5	13.6	4.6	16.5	1.1	4.6
Switzerland	1.0	3.9	.9	3.2	1.0	4.2
France	2.6	10.1	1.5	5.4	.9	3.8
Others	2.0	7.8	2.2	7.9	2.3	9.6
Total	25.7	100.0	27.9	100.0	23.9	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume I11, 1969, 1970, and 1971, published by the Organization for Economic Cooperation and Development (OECD), based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

The outlook for the country's MHE&S market is optimistic since the GDP has returned to a higher growth rate (estimated at above 7% in 1972). Other major factors, such as expansion and modernization in major industries and the progressive attitudes of management, should boost demand for a variety of materials handling equipment and systems.

Five Mexican industries which are important consumers of MHE&S—chemicals, food processing, primary metals, paper, and automotive products—are discussed below:

Chemicals.—The value of production in the basic chemical industry, excluding paints and varnishes, plastics, fertilizers and insecticides, and pharmaceuticals, reached $1.2 million in 1970. This represents an increase of 13% over the 1969 value as compared to the 15% average annual rate of increase established during the previous 5 years. As the economy recovers, the chemical industry should expand its markets. An annual increase in sales of chemical products of at least 15% is predicted through 1977.

Cumulative private capital investment in the chemical industry totaled $1.2 billion at the end of 1971. Investment expenditures during 1972 were estimated at $280 million, more than double the 1971 investment level of $120 million. Trade sources anticipate that to keep up with demand the chemical industry will have to invest a massive $4.8 billion over the next 10 years.

Chemical firms purchased MHE&S valued at approximately $8 million in 1971. They are expected to spend about $12 million in 1973. The chemical industry's purchases of MHE&S are anticipated to rise to $16 million in 1974, making it the largest single buyer of materials handling equipment in Mexico. Demand for handling systems in the sector is growing because of rising labor costs and the need for increased production.

The chemical sector is expected to import a range of products from the United States that are not domestically produced. These include special kinds of chain conveyors, bridge and jib cranes, hoists, elevators (especially pneumatic types), and vacuum-lifting equipment. Industrial tractors and hand-lift and platform floor trucks, load-controlling devices, palletizing and depalletizing equipment, and vibrating feed equipment also will be imported.

Celanese Mexicana, S.A., with over 6,000 employees and six plants, is the largest privately owned firm in the chemical industry and one of the largest corporations in Mexico. The chemical division of Celanese Corporation produces petrochemicals and cellulose plastics at its plants in Celaza and San Cristobal. Four of the company's plants are devoted to fibers production. They are located in Ocotlan, Zacaper, Toluca, and Rio Bravo. The company plans to invest some $16 million in new equipment during the period 1973-76. Of this total, about $240,000 will be used to purchase imported MHE&S.

Food processing.—The Mexican food processing industry comprised over 1,000 establishments and employed about 156,000 people in 1970. The total value of goods processed, $2 billion, accounted for close to 8% of Mexico's gross national product for 1970. The industry imported an estimated $5.7 million of MHE&S in 1971. Imports are projected to reach $8.4 million in 1974.

Government efforts to improve agricultural production are expected to result in the rapid expansion of Mexico's canned vegetable and fruit industries. A 16% average annual increase is forecast for the industry. Its products have become more popular in the country as a result of urbanization and better distribution of income. Canners should purchase more MHE&S in the near future, especially conveyors, industrial vehicles, and load-controlling and vibrating feed systems. Mexican trade sources predict that canners will import materials handling equipment and systems valued at $1 million in 1974.

Production of crackers, cookies, and noodles also is expected to increase. This is a result of the improvements in the supply of raw materials and new marketing techniques that have been introduced, chiefly by Nabisco, Inc. Manufacturers of these goods are ready for broader applications of materials handling techniques. Sales of conveyors, industrial trucks, and vibrating food systems should increase. This segment of the food industry is expected to spend $700,000 on imported MHE&S in 1974.

Production of edible oils, fats, and margarine increased by an average of 25% a year during the 1966-70 period. While growth is expected to slow down, this segment of the food industry should continue to be a good customer, with expected imports of MHE&S of almost $1 million in 1974. Several large producers are planning substantial expansion and are expected to develop wide-scale use of materials handling systems.

Planned expansion and modernization of sugar mills also will require sizable investments in both standard and advanced materials handling equipment and systems. The Mexican Government's agreement to permit an increase in the price of sugar and Government assistance programs have sparked industry plans to increase capacity. An 8% average annual growth rate is predicted for this industry through 1977. Its 1974 expenditures for imported MHE&S equipment are forecast at $2 million.

Production of the Mexican beverage industry, with 524 firms and 78,500 employees, grew an average of 12% per year from 1966 to 1970. It is expected to maintain this rate through 1977. The highly competitive soft drink sector imported materials handling equipment valued at $500,000 in 1971. Purchases are expected to reach $620,000 in 1974. The 50 companies producing wines and liquors in Mexico use lift trucks and band conveyors extensively in their operations. They now plan to use more button-operated hoists and monorail equipmen to move packed cases. Investment in plant renovation and materials handling equipment in this industry should total about $20 million from 1973-76, with about $984,000 predicted to be invested in MHE&S in 1974.

Beer production was valued at $275 million in 1971. An average yearly production increase of 9% is projected during the 1972-77 period. Breweries use overhead cranes, lift trucks, and conveyors in conjunction with automatic bottling and packing machines. Cerveceria Cuauhtemoc, S.A., which has installed automatic and semiautomatic equipment in the bottling process, has expressed interest in automated packing equipment. The beer industry has shown a definite trend toward a wider use of advanced materials handling systems. Its MHE&S purchases should be on the order of $900,000 in 1974.

Imports are expected to fill a substantial portion of the food processing industry's requirements for materials handling equipment and systems. Belt conveyors are expected to be the most popular item, with imports projected at $750,000 in 1974. The value of imported roller conveyors is expected to rise from the 1971 level of $200,000 to $400,000 in 1974. Imports of industrial tractors by the food industry were valued at $160,000 in 1971 and should reach $280,000 in 1974. The value of imported bridge cranes, $150,000 in 1971, should reach $250,000 in 1974. The food processing industry's imports of specialized materials handling equipment for load control are expected to reach $250,000 in 1974.

ACCOSA, a subisidiary of Anderson, Clayton & Co., S.A., is one of the largest private companies in Mexico and employs 2,900 people. ACCOSA reported 1972 sales of $138 million and plans to invest nearly $2.4 million in plant modernization and expansion during the years 1973-75. At least $48,000 of this will be spent on imported MHE&S, principally conveyors, hoists, vacuum-lifting equipment, floor trucks, and load-controlling and vibrating feed systems. The company, considered typical of the larger firms in the food industry, already uses these products in its operations.

Primary metals products.—Production of primary metals products more than doubled during the 1960's, increasing from 1.7 million tons to 4.3 million tons. Approximately 43,450 workers were employed in the sector in 1970, and their output was valued at $664 million.

The Mexican primary metals industry is composed of four integrated plants, 19 semi-integrated plants, 40 laminating plants, and 69 plants producing pipes, screws, and nails. The three top producers of steel ingots in 1970 were Altos Hornos de Mexico, S.A., Cia.; Fundidora de Hierro y Acero de Monterrey, S.A.; and Hojalata y Lamina, S.A. Altos Hornos de Mexico, the largest producer, had a capacity of 2.75 million tons in early 1973 and may increase production to 4.4 million tons by 1980. Fundidora de Monterrey, the second largest producer, is expanding its capacity to 1.65 million tons in 1975 and has plans to increase to 2.2 million by 1980. Hojalata y Lamina expects to reach a capacity of 1.43 million tons by 1976. The Mexican Government is building a large steel plant in Las Truchas, in the State of Michoacan. The plant will produce 1.8 million tons by 1975 and production capacity will reach 3.3 million tons by 1980.

The Government-owned corporation, Siderurgica Lazaro Cardenas—Las Truchas, S.A., Yucatan, is expected to purchase a significant amount of advanced materials handling equipment and systems to equip its facility now under construction in Las Truchas. The plant, financed by the World Bank, the Interamerican Development Bank, and banks of eight different nations, calls for an investment of $496 million between 1972 and 1976. Because of its multinational financing, the company is obliged to call for international bids when acquiring equipment, engineering services, or any other capital goods and services, thus affording excellent sales opportunities for American suppliers of MHE&S.

The annual demand for primary metals products in Mexico is expected to reach 6.71 million tons in 1975, and domestic industry is expanding to meet this rise. Capital investment in the industry is expected to exceed $640 million during the 1970's.

The primary metals products industry is a significant user of heavy and sophisticated MHE&S, both at plants and at distribution facilities. The industry's imports of materials handling equipment should exceed $3 million in 1974. This represents a fivefold increase over the sector's 1971 MHE&S imports of $600,000. Metals production firms will probably spend an estimated $750,000 on imported conveyors, $500,000 on cranes, and $300,000 on industrial vehicles in 1974.

Paper.—The Mexican paper industry is composed of 63 companies. Thirty-nine manufacture paper, 12 produce cellulose, and 12 make both cellulose and paper. The latter 12 account for about two-thirds of both the country's paper production and its total cellulose output. Total investment in the industry was estimated at $287 million in 1971, and 18,500 persons were employed.

Production of paper in Mexico is estimated to have increased 7.8% during 1972, reaching a record of nearly 1 million tons. Production should reach 1.65 million tons in 1975. The paper industry is expected to invest $160 million through 1975 in order to meet the growing demand. Pulp and paper production is expected to expand at an average annual rate of 9% during the next 5 years.

The paper industry will continue to be a significant user of materials handling equipment. The larger firms typically use materials handling equipment designed especially for this industry, as well as overhead cranes, lift trucks, and hoists. The paper industry's purchases of MHE&S reached a level of $500,000 in 1971 and are expected to double by 1974. The sector is expected to import materials handling equipment valued at $570,000 in 1974, over half of its total purchases. During 1974, imports of conveyors should approach $300,000; cranes, $150,000; and industrial tractors and floor trucks, $120,000.

Several large projects have been announced by the industry during the past 2 years. A new cellulose and paper complex with a 110,000-ton production capacity is to be constructed in Chihuahua. Other projects either already underway or planned include a newsprint plant to be located in Tuxtepec, that will be capable of producing 220,000 tons annually; a 33,000-ton-capacity paper plant in Sinaloa; and a paper products complex in Durango. Cia. de las Fabricas de Papel de San Rafael y Anexas, S.A., the industry's largest firm, plans to spend about $100 million during the 1972-77 period to increase its annual paper production from 121,000 tons to 352,000 tons. The company's plants in the State of Mexico are being expanded considerably, and new installations are under construction in Guerrero and Michoacan.

These large capital investments in new plant facilities and expansion of existing plants are expected to include purchases of advanced materials handling equipment. Sophisticated equipment will be essential if the Mexican paper industry is to compete with Chilean, Brazilian, Argentine, and Paraguayan suppliers who have access to the Mexican market as members of the Latin America Free Trade Association.

Kimberly-Clark de Mexico, S.A. (K-C), partly owned by the Kimberly-Clark Corporation of the United States, is one of the four largest producers of pulp and paper in Mexico and one of the two main suppliers of fine writing paper, printing papers, and tissue paper. K-C is one of the fastest growing companies in the paper industry. During the last 2 years, its sales have increased at a faster rate than any other firm in the industry. K-C plans to invest about $8 million to increase its capacity during the 1973-77 period, with 8% allocated for the purchase of imported MHE&S. K-C, considered the most advanced MHE&S used in the paper industry, utilizes conveyors, cranes, hoists, power trucks, floor trucks, and some systems and specialized equipment in the production and distribution processes.

Automotive.—The automotive industry is one of the largest manufacturing sectors in Mexico in terms of value of production and number of employees. Production was estimated at $686 million in 1971. The 16 companies producing automobiles, trucks, and tractors in the country employed 23,200 in 1970.

The sector is expected to show a 12% average annual growth rate in sales during the next 5 years. Volkswagen de Mexico, S.A. de C.V., plans to invest $20 million to manufacture two models in Mexico for export, and International Harvester Mexico, S.A. de C.V., is expected to make sizable capital investments to produce industrial tractors. These investments should stimulate purchases of MHE&S.

Major MHE&S purchases by the automotive industry, other than those connected with the expansion plans mentioned above, should result from efforts to cut production costs. Many manufacturers are installing advanced and automated systems to reduce labor and other costs. Automobile prices are regulated by the Government. Most of the sector's large investments in MHE&S occurred during the 1962-70 period when the industry expanded its capacity in compliance with Government requirements. Increased production will boost demand for conveyors, overhead cranes, and industrial vehicles for transporting parts. MHE&S purchases by the industry amounted to about $750,000 in 1971 and in 1972 and should reach $850,000 by 1974.

Chrysler de Mexico, S.A., a U.S. subsidiary with 4,400 employees and sales of $144 million in 1972, accounted for a 20% share of the Mexican automotive market. Chrysler is considered representative of the automotive industry's application of materials handling technology. The company uses conveyors, hoists, pulleys, and industrial vehicles of all kinds and plans to import additional MHE&S as it expands its motor plant at Lerma.

General Motors de Mexico, S.A. de C.V., the third largest producer of motor vehicles in the country, has the only semiautomatic final assembly line in the industry. The company uses lift trucks to unload parts from railroad cars, pushbutton-controlled hoists to lower automobile bodies and motors onto chassis, and a switch-operated tow assembly line. General Motors uses pushbutton-operated hoists and a conveyor line to move pieces to and from the baking oven in its paint department and lift trucks to move parts at the warehouses. The company plans to purchase more lift trucks and extend the tow system in its assembly line.

Competitive Environment

The domestic materials handling equipment industry comprises both Mexican and foreign companies. The development of the domestic industry has been fostered and protected by the Mexican Government. In addition to erecting import barriers to encourage Mexican production, the Government provides other incentives such as tax advantages for manufacturing firms classified under the designation "New and Necessary Industries." Further incentives are given to industries willing to locate in selected areas and to develop an export capability.

Two Mexican-owned companies, Campos Hermanos, S.A., and Industria del Hierro, S.A., dominate the crane and derrick field. Equipos Mecanicos, S.A., partly owned by Bucyrus-Erie, is the only significant U.S. affiliate in this field. The only other foreign subsidiary supplying cranes and derricks is the German company, Tecnicos Argostal, S.A. A number of smaller Mexican firms, such as EISA Equipo Industrial, S.A., and Maquinaria Intercontinental, S.A., are also active in the production of cranes and derricks.

Hoists are produced by a number of local firms. Jeffrey Manufacturera, S.A., is the only American-owned major supplier. The Swiss firm Wormser-Suiza de Mexico, S.A., and the German Tecnicos Argostal are also large suppliers. Two U.S. subsidiaries, Link-Belt Mexicana, S.A., and Stephen-Adamson de Mexico, S.A., are the most prominent manufacturers of conveyors, although Iman, S.A., and Maquinaria ERSA, two important Mexican-owned firms, produce belt and bucket conveyors as well as cranes and pillar hoists. Two other U.S. affiliates, Jeffrey Manufacturera, S.A., and Alvey Conveyor Mexicana, S.A., are also capable of fabricating all types of conveyors. The Stephen-Adamson plant in Mexico City is relatively new and the only local supplier of elevators.

Three Mexican affiliates of large U.S. manufacturers dominate the local production of industrial vehicles. A.C. Mexicana, S.A., is a subsidiary of Allis-Chalmers, and Montacargas de Mexico, S.A., is owned by Eaton-Yale/Towne. The third large supplier, Productos Industriales, is partially owned by Clark Equipment. These companies are allowed to complement their Mexican production by imports from the U.S. parent firm. The only non-U.S. imported brand that has been successful is Komatsu, a Japanese line represented locally by DECSA.

Materials handling equipment from the United States is recognized by Mexican users as being well designed and durable. Another facility much appreciated by Mexican buyers is that U.S. firms have an ample supply of parts and well-trained service personnel. American manufacturers are the leaders in this import market and are expected to maintain that position for the foreseeable future.

The growth of the Mexican MHE&S industry has historically followed the pattern for manufacturing

Table 3.—U.S. exports to Mexico of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description or product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	692	212	495	469
Parts for above	451	549	376	444
Other cranes, unmounted	390	1,075	710	1,350
Other crane parts	124	204	432	98
Subtotal, cranes and parts	1,657	2,040	2,013	2,361
Hoists	732	631	494	620
Parts for hoists	77	139	192	759
Derricks	115	—	11	—
Winches	271	357	416	510
Parts for above, etc.	253	235	273	196
Hydraulic jacks, parts	487	367	302	162
Other jacks and parts	219	258	182	241
Other lifting equipment	273	505	338	427
Subtotal, lifting equipment	2,427	2,492	2,208	2,915
Elevators, escalators	174	93	131	148
Parts for above	250	279	381	296
Gravity conveyors	23	32	26	135
Overhead conveyors	59	49	60	103
Pneumatic conveyors	21	72	530	244
Wheeled conveyors	66	19	12	27
Other conveyors	1,360	795	1,265	1,077
Parts for conveyors	657	620	1,079	624
Subtotal, conveyors and parts	2,610	1,959	3,484	2,654
Used and rebuilt tractor shovel loaders (TSL)	271	430	136	245
Front-end loaders for mounting on TSL	77	113	39	54
Subtotal, loaders and used TSL	348	543	175	299
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	147	295	131	326
4-wheel drive, -1	24	194	45	43
4-wheel drive, 1-1.49	24	—	—	86
4-wheel drive, 1.5-1.99	22	—	2	144
4-wheel drive, 2-2.49	22	262	51	18
4-wheel drive, 2.5-3.49	28	16	—	—
4-wheel drive, over 3.5	828	408	472	913
Subtotal, wheeled TSL	1,095	1,175	701	1,530
Total, lifting, loading, and conveying equipment	8,137	8,209	8,581	9,759
Industrial vehicles (IV)				
Walking and powered IV	139	55	57	32
Electric-powered IV	186	94	141	172
Gasoline-powered IV	494	850	592	524
Other-powered IV	181	395	617	131
Portable stackers	97	139	111	292
Parts for above	2,032	3,441	3,059	2,903
Total, industrial vehicles	3,129	4,974	4,577	4,054
Total, materials handling equipment	11,266	13,183	13,158	13,813
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng. H.P.	1	21	—	—
45-49.9 eng. H.P.	72	41	—	105
60-89.9 eng. H.P.	643	650	976	2,387
Over 89.9 eng. H.P.	1,821	1,651	1,189	1,575
Subtotal, tracklaying TSL	2,537	2,363	2,165	4,067
Underground loaders	133	59	372	242
Parts for above	78	100	33	54
Oil field rod-lift equipment	54	169	89	—
Oil field derrick pts.	78	—	213	43
Other oil field lift equipment	551	356	99	95
Farm elevators	37	29	18	23
Parts for above	—	46	8	—
Automobile lifts	63	28	190	27
Underground mine conveyors	3	67	59	—
Subtotal, other equipment	997	854	1,081	484
Total, tracklaying and other equipment	3,534	3,217	3,246	4,551
Grand total, mechanical handling equipment	14,800	16,400	16,404	18,364

as a whole. As the Mexican economy experienced a slight recession during 1970 and 1971, production of materials handling equipment declined from $47.4 million in 1970 to $40.9 million in 1972. This trend is expected to reverse, and production should grow at an average annual rate of 9% during the 1973-77 period.

Suppliers finance the importation of most high- and medium-value MHE&S. It is estimated that about 60% of the total cost is borne by the manufacturer or importer, and the remainder by private and official institutions. Short-term credit is generally provided by commercial banks. The principal sources of medium- and long-term credit are the private finance companies. Under certain conditions the Nacional Financiera, primarily a Government development bank, is an additional source of financing.

The official Mexican trade policy is to protect and encourage domestic industry. Customs duties on MHE&S, which apply equally to all countries, range from 10 to over 25% ad valorem. Once equipment is imported and the duties paid, it is treated on a par with locally produced products. Leased equipment is valued on the same basis as equipment sold for customs purposes. Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-242), U.S. Department of Commerce, Washington, D.C. 20230.

Technical Requirements

Electrical supply characteristics for the City of Mexico and within a radius of approximately 155 miles surrounding the Federal District are 110/220 volts, 50 hertz. The remainder of the Republic uses 60 hertz. A total changeover to the latter is planned, effective April 1974. Mexico uses the metric system of weights and measures. There are no legal labelling requirements pertaining to MHE&S in Mexico. The Mexican branch of the American Society of Mechanical Engineers is attempting to apply U.S. standards to the sale and use of MHE&S in Mexico. Detailed information on technical requirements can be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

"The Market for Materials Handling Equipment and Systems in Mexico," DIB 73-12-510, May 1973.

The Netherlands

Ever-increasing wages, stemming from the scarcity of labor, are expected to generate a soaring demand in the Netherlands for high-technology labor-saving materials handling equipment and systems (MHE&S).

The average growth rate is projected at over 10% per year during the period 1972-77. Total sales are expected to rise to about $240 million by 1977 from less than $148 million in 1972 (see table 1).

Lifting, loading, and conveying equipment, which in 1972 accounted for $126.6 million, or 85.7% of sales, should continue to be in strong demand; 1977 sales of such products are projected at $206 million, or 86% of the total market. Industrial vehicles are expected to rise from $21.2 million (14.3% of the market) in 1972 to over $33 million (14%) in 1977.

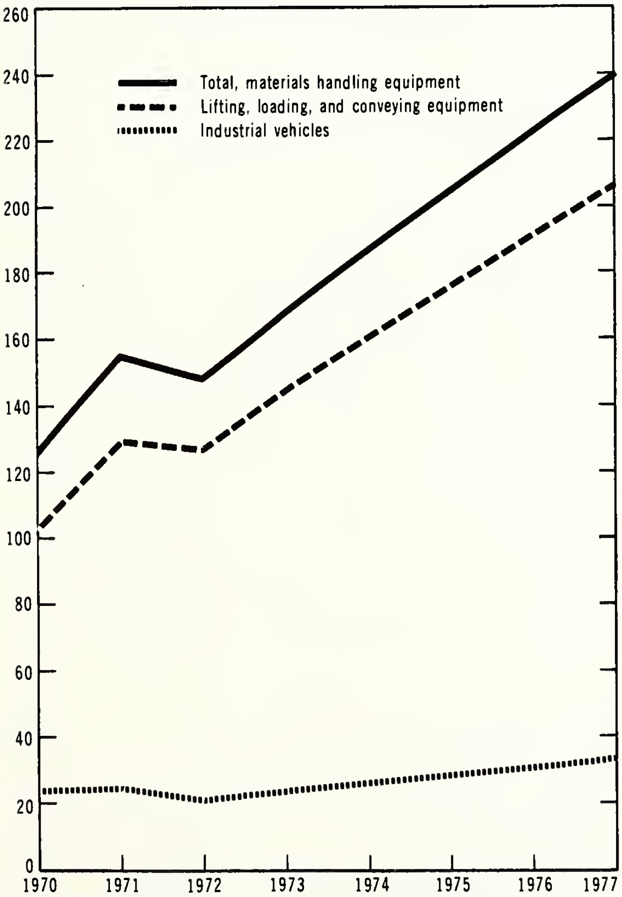
Imports, which accounted for over two-thirds of domestic consumption in 1972, totaled over $106 million. Lifting, loading, and conveying equipment accounted for $86 million, or 81% of this total, and industrial vehicles accounted for $20 million ,or 19%. Total imports in 1977 are projected at $175 million, reflecting an annual growth rate of over 10%.

U.S. exports of *mechanical* handling equipment in 1971 were valued at $10.5 million, or 9% of Dutch imports (see table 2), representing an increase of 44% over U.S. exports of $7.3 million in 1969. The U.S. share of the import market is expected to improve to at least 15% in 1977, for a total of more than $25 million, due largely to Dutch emphasis on productivity and the recently improved competitiveness of American products.

The major supplier of mechanical handling equipment in the Dutch market is Germany, which in 1971 exported $53.6 million, or 46% of the total. Other significant exporters are France, which supplied equipment valued at $12.7 million (10.9%); the United Kingdom, $11.7 million (10%); and Belgium, $8.7 million (7.5%).

Netherlands: Size of market for materials handling equipment, 1970-72,and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by the Office of International Marketing, U.S. Department of Commerce, official Netherlands statistics, and trade estimates.

Table 1.—Netherlands: Size of the market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	74.3	89.1	89.9
Imports	63.9	77.6	86.0
Exports	35.4	37.5	49.3
Market size[2]	102.8	129.2	126.6
Industrial vehicles			
Production	16.3	20.9	21.7
Imports	26.4	26.5	20.1
Exports	18.9	22.5	20.6
Market size	23.8	24.9	21.2
Totals, materials handling equipment			
Production	90.6	110.0	111.6
Imports	90.3	104.1	106.1
Exports	54.3	60.0	69.9
Market size	126.6	154.1	147.8

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[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values based on Dutch trade estimates. Foreign trade values based on official Dutch statistics published by the Centraal Bureau voor de Statistiek.

Statistics taken from *Exports, Commodity by Country,* FT-140, an annual publication of the U.S. Census Bureau, show in detail U.S. exports to the Netherlands of *materials* handling equipment in selected years (see table 3).

Specific Sales Opportunities

A recent market research study conducted in the Netherlands for the U.S. Department of Commerce identified the following items as representing favorable sales opportunities for American manufacturers:

Lifting, Loading, and Conveying Equipment

- Mobile cranes
- Off-shore cranes
- Container cranes
- Electric hoists
- Conveyor belts, chains, and other accessories
- Hoisting and lifting chains and crane hooks
- Stackers

Industrial Vehicles

- Lift trucks
- Pallet trucks
- Reach trucks
- Order-picking trucks
- Lift truck attachments

Systems and Specialized Equipment

- Electronically controlled order-picking systems
- Optical electronic control equipment
- Palletizing and depalletizing equipment
- Cold storage handling equipment
- Loading ramps
- Containerization systems and equipment
- Airport baggage handling equipment
- High-bay warehouses

Lifting, loading, and conveying equipment.—Sales of lifting, loading, and conveying equipment, which represented over 85% of the Dutch materials handling market in 1972, are expected to grow by over 10% per year through 1977. The demand for cranes and other lifting equipment should be particularly strong and will offer numerous opportunities for U.S. exporters as Dutch companies upgrade their more conventional cranes and lifting equipment. Sales of cranes and other lifting equipment in 1972 were valued at $65 million, or over 40% of total materials handling equipment sales.

Imports, which have been growing at over 15% per year, account for three-fourths of the requirements. Demand is sharpest for jib-cranes, derricks, bridge cranes, and goliath cranes, sales of which totaled $32 million in 1972. Sales of winches, capstans, hoists, and jacks were valued at $27 million in 1972, and mobile cranes at $6.4 million.

The rapid advance of containerization, especially in overseas cargo handling, has opened a new field of application for special heavy-duty cranes. Joint pioneering efforts of U.S. and Dutch crane manufacturers in the harbor of Rotterdam are soon expected to open up the hitherto conventionally operated port facilities to rapid containerization. U.S. firms, which supplied several heavy-duty units with values from $650,000 to $1 million each prior to 1972, should expand their market share in the future.

Increasing mechanization of storage and distribution facilities should lead to a growing demand for conveying equipment. Total domestic sales of conveying equipment in the Netherlands reached $40 million in 1972, a 12% increase over 1970, and accounted for one-fourth of the total MHE&S market. Exports from the United States amounted to $1 million.

Industrial vehicles.—Industrial vehicle sales were $21.2 million in 1972 and are expected to exceed $33 million in 1977. Imports account for 75% of consumption. Very good long-term growth prospects are forecast by industry end-users as industrial vehicles begin to replace other forms of materials handling equipment. Growing sales will also result from management techniques that concentrate on utilization of operators rather than equipment. Current management thinking in the Netherlands favors ordering more than one truck per operator.

Forklift trucks now dominate this sector of the Dutch market; 2,160 were sold in 1971, representing three-fourths of all industrial trucks supplied. Other sales were of stackers, 393; reach trucks, 154; and order pickers, 184. Bin systems that can be loaded or unloaded by forklift trucks, reach trucks, or slide-loading trucks are preferred to more sophisticated systems.

The market for lift truck attachments also is growing. A large demand backlog seems evident, since the ratio of attachments to lift trucks is 20 to 1. The corresponding ratio in the United States is 10 to 1. The attachments market reached $1.4 million in 1972 and is expected to double by 1977.

Systems and specialized equipment.—There is a growing demand for systems to solve problems of materials flow in production and distribution. Approximately 10 high-bay warehouses have been established in the Netherlands by U.S. and German firms. The demand for such warehouses is placed at $3 million during the period 1972-77. More extensive use of complete container-handling systems is anticipated, as well as a wider use of container cranes and stacking cranes.

Electronically controlled conveyor systems for storage and loading are already used extensively by the food and beverage industries. The first fully automated, computer-controlled, order-picking system is now being installed by a U.S. company. Parcels will move on a gravity conveyor by electronic command to a powered conveyor that will route the articles to either pallets or trolleys. If successful, the $1-million system is expected to create considerable demand for similar installations.

Additional specialized equipment with good sales potential includes photoelectric coding and decoding equipment for intraplant automated transport systems. Similar electronic equipment for sorting parcels according to size has also generated interest, and photo-switch equipment already comprises a $100,000-a-year market. Much wider use of such optical-electrical materials handling control equipment is considered likely.

Special equipment for cold storage plants, such as heated cabs for industrial trucks, is new to Europe and can be assured a ready market. Airport equipment, including tow tractors, pallet loaders, and baggage-handling equipment, is expected to be in great demand as airports expand to accommodate large jets.

Loading ramps and platforms that permit industrial vehicles to be driven into trucks or containers are in demand. Annual sales by 1977 are expected to climb to 30 units valued at $1 million. End-user preferences are for lightweight mobile ramps and platforms.

End-User Analysis

The Netherlands, which is one of the leading importers of U.S. goods in the world, should continue to import large quantities of materials handling equipment from U.S. manufacturers. Capital investments were expected to increase by 8.5% in 1973, as Dutch industry pursued its ongoing program of plant modernization and expansion.

Investment in the transportation industry, which always has requirements for MHE&S, is expected to increase even more rapidly than for the economy

Table 2.—Exports of mechanical handling equipment to the Netherlands by principal suppliers, 1969-71[1]
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	7.3	10.2	9.5	8.9	10.5	9.0
Germany	36.5	51.0	51.3	48.2	53.6	46.0
France	5.0	7.0	8.5	8.0	12.7	10.9
United Kingdom	6.3	8.8	13.6	12.8	11.7	10.0
Belgium	6.1	8.5	9.9	9.3	8.7	7.5
Others	10.4	14.5	13.7	12.8	19.4	16.6
Total	71.6	100.0	106.5	100.0	116.6	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by OECD, based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

as a whole. A 10 to 12% annual increase in investment in labor-saving materials handling equipment is anticipated as the cost of Dutch labor continues to rise.

Although the application of materials handling equipment in the Netherlands is quite sophisticated in some sectors, the demand for specialized high-technology systems should be strong as industry attempts to modernize. Rotterdam harbor, for example, has not installed a single mechanized storage system, apart from container facilities. Manual labor, handcarts, and the use of handwritten notes are still typical in large segments of Dutch materials handling and cargo distribution.

Sectors that should provide considerable sales opportunities for U.S. suppliers include cargo transport and storage. Large orders can be anticipated from the various firms handling cargo at Rotterdam harbor. The rapidly expanding chemical, electrical, and food industries are also good prospects, since much of these large industries' storage and distribution facilities now use conventional materials handling techniques.

The strong Dutch shipbuilding industry is expected to shift a considerable amount of its sophisticated materials handling needs to U.S. suppliers as a result of the latter's new price competitiveness. These five industries—cargo transport and storage, food, shipbuilding, chemical, and electrical—account for approximately 75% of total materials handling equipment and systems purchases.

Cargo transport and storage.—This sector, which includes harbor activities, warehousing, and trucking, is one of the most important customers for MHE&S. The Netherlands, because of its location at the mouth of the Rhine, is a major transshipping point for Western Europe's large industrial centers. The cargo transport and storage sector accounts for 10% of the gross national product. It has some 3,000 enterprises employing 167,000 workers. Sales increased from $2.4 billion in 1969 to $3 billion in 1972.

Since materials handling is the principal function of this sector, it is not surprising that over one-third of total Dutch consumption of materials handling equipment is in this sector. Ten percent of the industry's 1972 investment of $512 million, or about $51 million, was allocated to the purchase of forklift trucks, cranes, hoists, and other materials handling equipment.

In view of a projected 10% annual increase in the volume of business and a pressing need to cut soaring labor costs, purchases of materials handling equipment should increase. Purchases were estimated at $61 million in 1973 and are expected to reach $72 million in 1974. Interest will center on containerization, automatic storage, computer-controlled materials handling, and automatic palletizing and depalletizing.

U.S. cranes to handle and stack 40-foot containers are of great interest. Market inquiries indicate annual sales of three to four such units valued at between $650,000 and $1 million each.

Demand is growing for heavy-duty forklift trucks with a capacity of 40 to 50 tons. Annual market potential is estimated at 30 to 40 such units valued overall at approximately $1 million.

The major consumer of materials handling equipment within the cargo transport and storage sector is Rotterdam harbor. The harbor is not a single business entity but rather a group of some 40 major and 60 medium and small companies that use materials handling equipment. However, a common consulting agency, Sheepvaart Vereeniging Zuid, advises all companies on the procurement of MHE&S.

Recent research revealed the following equipment in operation at Rotterdam harbor at the end of 1972: 1,600 forklift trucks, 420 cranes, 28 loading bridges, 20 container cranes, 48 floating cranes and derricks, and 25 floating elevators. This equipment is conservatively valued at $200 million.

Future materials handling equipment requirements at Rotterdam harbor are estimated to total over $22 million annually, due largely to the growing emphasis on containerization. The number of containers unloaded jumped from 103,000 in 1969 to 155,000 in 1971, an increase of 50%. Loaded containers showed an even larger growth, increasing from 93,000 in 1969 to 164,000 in 1971. Preliminary figures indicate a further increase of 40% in 1972.

Food industry.—The food industry is the largest industry in the Netherlands. It employs 193,000 workers in 1,600 enterprises and produces goods valued at $8.6 billion annually. Sales increased by 30% between 1969 and 1972 and the industry expects average annual growth rates of at least 10%. Investment in 1973 increased by an estimated 15% over the 1972 level of $320 million.

Materials handling equipment is utilized widely in the storage and distribution of foodstuffs and only sparingly in the production process. Industry investment in materials handling equipment in 1972 reached $25.6 million, 8% of total investment. With storage and distribution costs representing 8 to 10% of retail prices, the food industry is expected to mechanize its materials handling facilities rapidly.

Food production favors the use of continuous conveyors. Approximately $12.8 million in conveying equipment is installed annually. Palletizing machines, both fully automatic and semiautomatic, are in wide use. There is perhaps a market of up to $1 million for suction heads to be used on palletizing machines.

U.S. suppliers of order-picking equipment have already secured annual sales of $160,000, and high bays of U.S. origin are considered to have sales prospects of $1.3 million per year. There is a continuing need for lightweight lift trucks.

The giant Anglo-Dutch international corporation, Unilever, dominates the food industry. In addition to foodstuffs, which account for about one-half of its production, Unilever produces laundry detergents, chemicals, textiles, and packing materials. The company, headquartered in Rotterdam, employs 33,000 workers and has annual investments of approximately $25 million. Materials handling equipment purchases are estimated at $3.2 million yearly.

Unilever's materials handling equipment includes 150 lift trucks, electric conveyors, cranes, and hoists. Semiautomatic and fully automatic palletizers are standard equipment at most Unilever plants and warehouses; order-picking is frequently handled manually, however, with the aid of order-picking trucks.

Unilever plans to modernize its materials handling capabilities and has expressed interest in U.S. equipment. Modern suction-lift depalletizing equipment adapted for use in cold storage facilities, conveying equipment, packing machines, lift trucks, and full storage systems are products with sales potential at Unilever.

Shipbuilding.—In spite of stiff international competition, the Dutch shipbuilding industry increased its sales from $720 million in 1969 to $1.15 billion in 1972. Some 260 shipbuilding enterprises with a total of 49,500 employees had 1972 capital expenditures of $48 million, of which a remarkably high 20%, or $9.6 million, was for materials handling equipment.

Increasing demand for larger ships is likely to lead to the expansion of many shipyards to accommodate vessels of up to 400,000 tons. Capital expenditures are expected to rise at an annual rate of 10 to 12%, while the share of materials handling equipment is expected to remain at 20%. This corresponds to purchases of materials handling equipment valued at approximately $13 million in 1974.

Shipyard requirements include cranes of all types, elevator platforms, elevators, and, to a lesser extent, industrial trucks. There is little demand for conveying equipment. U.S. manufacturers have supplied specialized hoists for welding and sandblasting operations, mobile cranes, special mobile elevators, and forklift trucks.

Purchases of materials handling equipment for installation aboard ships under construction are also important. Cargo vessels and fishing boats have large requirements for cranes, and current plans call for the construction of 124 such vessels.

Hoist and crane purchases for shipboard installation were valued at $13.4 million in 1972; they are expected to reach $14 million in 1973 and to exceed $15 million in 1974. Many types of hoists and cranes are needed, including loading and unloading units, elevators, anchor hoists, mooring-off winches, and davits.

Active participation by American manufacturers in "Europort," an international exhibition of shipbuilding, marine engineering, and port equipment held annually in Amsterdam, has generated lively interest in U.S. equipment. Recent currency realignment will improve the price competitiveness of U.S. equipment and should mark the beginning of a considerable increase in sales.

Rotterdamsche Drogendoc Matschapi (RDM), with a working force of 4,600, is the largest shipyard in the Netherlands. The shipyard is capable of building vessels of up to 250,000 tons and is now constructing three container ships for U.S. clients.

RDM's purchases of materials handling equipment for installation aboard ships is valued at $3.2 million, and capital investment aimed at increasing shipyard productivity is estimated at about $800,000 a year.

The company is considering expansion of its facilities to meet the demand for larger ships. In such cases, substantial purchases of truck lifts, mobile cranes, and cranes capable of handling whole ship sections can be expected.

Chemical industry.—Chemical production in the Netherlands has more than tripled during the past decade. Approximately 800 companies with 100,000 employees achieved sales of $3.8 billion in 1972. Annual growth in sales is expected to average 10% over the next few years.

Capital investment was valued at $576 million in 1972, about 17% of the total Dutch capital investment, and is expected to grow at a rate of 12 to 15% per year. Materials handling equipment investments in 1972 amounted to 2% of total industry investment, or $11.5 million.

Future purchases of materials handling equipment are projected at $11 million in 1973 and $13 million in 1974. About 50% of the MHE&S investment is for conveying equipment systems, 30% for industrial trucks, and 20% for hoists and lifts.

Conveyor systems are used to supply solid material for production lines in many chemical plants. Conveyor belts and pneumatic equipment are predominantly used.

U.S. products believed to have good prospects in the chemical industry include parts for conveying equipment. These parts, which are consumed at the rate of $4.8 million per year, include ball bearings, chains, rail constructions for overhead conveyors, lubricating equipment, and coated conveyor belts that have been acidproofed or that can be exposed to extreme temperatures.

The potential U.S. share of this market segment is projected at $560,000 in 1974 and $640,000 in 1975. The chemical industry purchased lift trucks and attachments valued at $3 million in 1972. The U.S. market share for these products, currently 30%, is expected to exceed $1 million by 1975.

The largest Dutch chemical company, Enko-Glanzstoff, located in Arnheim and Emmen, has a work force of 15,000 and a sales volume of $800 million. Capital investments, which amounted to $35 million in 1972, remained at approximately that level in 1973. Materials handling equipment used in production processes includes trolley or roller conveyors and 10 semiautomatic palletizing machines. Future requirements for production-related materials handling equipment are estimated at over $400,000 per year.

Ten percent of Enko-Glanzstoff's finished products account for 80% of its sales. The remaining 90% of the products have a very slow turnover and thus present storage and handling problems. These products are stored in the company's warehouse in Emmen which can accommodate 40,000 pallets.

Products are stored on pallets placed on the ground rather than on shelves or bays and are moved with lift trucks. Approximately 180 lift trucks are used, predominantly electrically powered and of 1.5-ton capacity. Other equipment includes 5 mobile cranes, each valued at $64,000, and 60 electric or liquid-gas-driven tractors. Annual orders for lift trucks, including replacements, are estimated to be 30 to 35 units totaling about $250,000.

The company plans to modernize the Emmen warehouse in the near future with the introduction of a punched-card controlled storage system.

Electrical industry.—Production of the Dutch electrical industry rose from $2.34 billion to $2.72 billion between 1969 and 1972. The industry numbers 264 enterprises that employ 116,000 workers. From 1969 to 1972, capital investment rose from $95.8 million to $201.9 million. Annual growth rates of 8 to 10% for sales and 12 to 15% for investments are predicted over the next few years.

Approximately 6% of overall investment in 1972, or $11.5 million, was for materials handling equipment. Annual MHE&S purchases of $14 million are anticipated during the next few years.

Because Dutch production of electrical products is concentrated on light equipment and household appliances rather than on industrial equipment, materials handling problems are centered on parts storage, assembly line supply, and stockpiling of finished products.

Belt conveyors, moving tables, and other continuous conveying equipment are the most widely used equipment within production departments. Storage and distribution facilities, presently based on conventional systems, will be the focus of increased investment in the future. Fully automated storage systems will require investments on the order of $3.2 million annually.

Lift trucks valued at some $3.5 million are purchased annually by the electronics industry. Moderate growth rates of 5 to 10% in this equipment sector can be expected. In addition, there is a marked upward trend in the market for conveying equipment parts, currently estimated at about $300,000 per year.

The electrical industry is dominated by Philips Gloelampen Fabrik in Eindhoven. Philips' total capital investment in the Netherlands in 1972 amounted to $144 million, of which $8 million was devoted to materials handling equipment.

A completely new warehouse for electronic components was erected in Rozendaal about 8 years ago. Induction-controlled driverless electrical trucks were used. This installation, now considered obsolete, will be replaced by a 30-meter high-bay storage facility estimated to cost over $7.7 million.

Six high stackers for six aisles will be required and another six high stackers will be added at a later date. In its first stages, the facility will handle 500 to 600 incoming and outgoing pallets. The company's warehouse at Drachten will also probably be modernized.

The Philips distribution center at Eindhoven is considered one of Europe's most progressive facilities. The basic idea of the Philips-designed system is to store and commission fast-moving bulky goods automatically while relying on conventional order-picking of numerous small items. There are 42 conveyor tracks that store and automatically retrieve 42 different types of goods. The system can be expected to handle an additional 24 products. Final pallet assembly is still done by hand, however.

U.S.-supplied photoelectric sorting equipment and chains have been incorporated into the conveyor system. Other materials handling equipment includes 14 lift trucks, of which 4 are clamp lift trucks imported from the United States, 4 reach trucks, 20 electrical industrial trucks, and 6 driverless electrical trucks. Materials handling equipment at other Philips locations brings the total number of lift trucks in use by the company to 240, with annual replacement requirements amounting to about 40 units.

Competitive Environment

The Dutch materials handling equipment industry employs some 10,000 workers in 11 major firms, about 50 medium-size firms, and many smaller concerns. The 1972 production of MHE&S totaled $111 million. Exports, valued at $70 million, cor-

Table 3.—U.S. exports to the Netherlands of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	....	54	227	193
Parts for above	21	120	6	117
Other cranes, unmounted	264	778	1,485	1,388
Other crane parts	217	447	552	458
Subtotal, cranes and parts	502	1,399	2,270	2,156
Hoists	173	288	186	662
Parts for hoists	21	28	73	267
Derricks	....	....	....	417
Winches	332	165	1,084	1,149
Parts for above, etc.	192	247	214	742
Hydraulic jacks, parts	227	138	114	538
Other jacks and parts	136	63	14	47
Other lifting equipment	278	104	364	1,232
Subtotal, lifting equipment	1,359	1,033	2,049	5,054
Elevators, escalators	6	3	92	58
Parts for above	2	4	90	91
Gravity conveyors	15	78	3	22
Overhead conveyors	....	2	4	....
Pneumatic conveyors	1	1	1	....
Wheeled conveyors	12	....	....	....
Other conveyors	219	191	106	790
Parts for conveyors	434	370	523	698
Subtotal, conveyors and parts	689	649	819	1,659
Used and rebuilt tractor shovel loaders (TSL)	....	20	150	....
Front-end loaders for mounting on TSL	2	34	....	....
Subtotal, loaders and used TSL	2	54	150	....
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	....	29	....	....
4-wheel drive, -1	40	66	12	....
4-wheel drive, 1-1.49	....	23	33	....
4-wheel drive, 1.5-1.99	249	15	....	....
4-wheel drive, 2-2.49	....	....	....	....
4-wheel drive, 2.5-3.49	84	....	....	....
4-wheel drive, over 3.5	193	284	271	246
Subtotal, wheeled TSL	506	417	316	246
Total, lifting, loading, and conveying equipment	3,118	3,552	5,604	9,115
Industrial vehicles (IV)				
Walking and powered IV	120	231	193	125
Electric-powered IV	1	8	1	....
Gasoline-powered IV	307	291	484	344
Other-powered IV	352	382	25	76
Portable stackers	44	25	3	....
Parts for above	3,257	4,555	3,814	2,711
Total, industrial vehicles	4,081	5,492	4,520	3,256
Total, materials handling equipment	7,199	9,044	10,124	12,371
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng.	....	....	....	....
45-59.9 eng.	....	....	....	....
60-89.9 eng.	....	16	....	....
Over 89.9 eng.	....	....	....	....
Subtotal, tracklaying TSL	....	16	....	....
Underground loaders	....	....	....	....
Parts for above	8	1	....	....
Oil fld. rod-lift equipment	1	1	58	....
Oil fld. derrick pts.	9	64	4	464
Other fld. lift equipment	57	18	9	1,330
Farm elevators	....	....	43	....
Parts for farm elevators	....	....	....	....
Automobile lifts	16	147	288	256
Underground mine conveyors	....	....	....	....
Subtotal, other equipment	91	232	402	2,050
Total, tracklaying and other equipment	91	248	402	2,050
Grand total, mechanical handling equipment	7,290	9,292	10,526	14,421

Source: *Exports, Commodity by Country,* FT-410—1969, 1970, 1971, and 1972, U.S. Department of Commerce, Bureau of the Census.

respond to 63% of the production value. Production is expected to reach $161 million in 1977.

Fifteen percent of total MHE&S production is from foreign-owned companies. Hyster NV, a U.S. subsidiary, is the leading lift truck manufacturer in the Netherlands. It supplied about 25% ($5.6 million) of Dutch requirements for industrial vehicles in 1972.

Rapistan van der Lande, another U.S. subsidiary, is the dominant supplier of advanced conveyor systems, equipment, and accessories. The share of parts and accessories imported into the Netherlands directly from the United States by Rapistan van der Lande and incorporated into finished products represents as much as 40% of the total value of the installed equipment. Another U.S. subsidiary, Cascade NV, dominates the market for lift truck attachments, which was valued at $1.4 million in 1972.

Major Dutch firms include Industrie en Handel Mij Crain, Machine-Fabriek Stork Jaffa, and Machinefabriek Figee, which, along with several German firms, are the primary suppliers of harbor cranes.

The main domestic producers of conveying equipment are Escher B.V., G. G. Sanders and Zoon, Machinefabriek Gebr. Kinkenberg, and Conveyor Systems. These companies offer complete conveyor systems for production plants and warehouses but import many of the parts for these systems.

Planned expansion of domestic production is about 8% per year, which will not keep up with the projected increases in domestic consumption. Dutch Government policy neither discriminates against foreign-owned domestic producers or foreign suppliers, nor does it promote a "buy national" policy.

Foreign competitors supplying the Dutch market are widely dispersed throughout Europe and include both European firms and subsidiaries of U.S. manufacturers. German-based companies supplied 46% of total imports in 1972. Krupp and Ardelt GmbH markets harbor cranes and conveying equipment; Demag Fordertechnik supplies harbor cranes and conveying equipment and has installed a high-bay warehouse in Unilever. Industrial trucks are marketed in the Netherlands by Pfaff GmbH and Stoerer AG, and Mannesmann Geisel GmbH features high-bay warehouses.

U.S. subsidiaries producing in Germany for the Dutch market include subsidiaries of Clark Equipment Co. (forklifts), Eaton, Yale and Towne, Inc. (pneumatic conveyors), Westinghouse Electric Corp. (elevators), and P. and H. Harnischfeger Corp. (cranes).

United Kingdom-based firms supplied 10% of Dutch MHE&S imports in 1972. The major British supplier in the Netherlands market is Lansing Bagnall, Ltd., which supplies reach trucks and side-loading trucks to Unilever.

Hoists are exported from Britain to the Netherlands by a subsidiary of the Bucyrus-Erie Co. (U.S.); a subsidiary of the M.H.S. Div., American Chain and Cable Co. (U.S.), is a major supplier of conveying equipment.

The Netherlands is a member of the European Economic Community; the Community's common external tariffs, therefore, apply to all imports. Duties on lifting, loading, and conveying equipment range from 4 to 10% and duties on industrial vehicles range from 5 to 9.5%. Information on specific rates may be obtained from the Domestic and International Business Administration (Room 4217), U.S. Department of Commerce, Washington, D.C. 20230.

Technical Requirements

Technical standards for materials handling equipment in the Netherlands are issued by Nederlands Normalisatie Instituut, Polakweg 5, Rijswijk. The institute's publication N-1108 contains full information on required norms.

Standards for elevators are issued by Nederlands Instituut voor Lifttechniek, Technische dienst, Niewe Amstelstraat 21, Amsterdam, which also carries out inspections.

Forklift truck standards and inspections fall under the E.V.O., Rooseveltpantsoen 3, The Hague.

Mobile crane requirements are issued by the Directoraat Generaal Von de Arbeid, Balen van Andelplain 2, Voorburg.

Detailed information on technical requirements may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

Normal electricity supply in the Netherlands is 220 volts, 50 hertz. Metric weights and measurements are used.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (Room 1617-M), Washington, D.C. 20230:

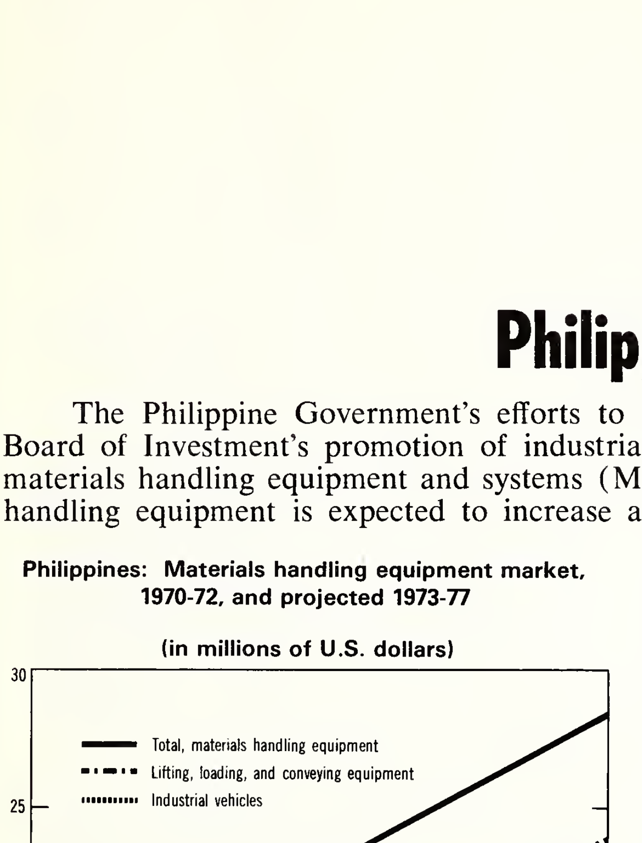
"The Market for Materials Handling Equipment Handling Systems in the Netherlands," DIB 73-12-514, April 1973.

Philippines

The Philippine Government's efforts to spur economic development, particularly the Board of Investment's promotion of industrial growth, should lead to increased demand for materials handling equipment and systems (MHE&S). The country's market for materials handling equipment is expected to increase at an average annual rate of 7.8% from the estimated 1972 level of $19.5 million and may reach $28 million in 1977. Sustained demand kept the Philippine market steady during 1970 and 1971, with sales of $21.4 million and $21.8 million, respectively. (See table 1.)

Philippines: Materials handling equipment market, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by, Office of International Marketing, U.S. Department of Commerce, official Philippine statistics, and trade estimates.

Estimated purchases of $16.9 million of lifting, loading, and conveying equipment accounted for over 86% of the total market in 1972. Sales in this product category in 1977 are projected at $23.8 million. The 1977 forecast for Philippine purchases of industrial vehicles is $4.5 million, up significantly from 1972 purchases of $2.6 million.

Imports accounted for 92% ($17.9 million) of the materials handling equipment market in 1972 and should climb to $26 million by 1977, as local production will continue to be limited to a few types of lifting, loading, and conveying equipment.

The United States was the Philippines' largest supplier of *mechanical* handling equipment in 1971, with 41.4% ($7.7 million) of the import market. (See table 2.) The U.S. share of the import market is expected to increase to 47% ($13 million) in 1977.

Japan is the United States' closest competitor in the Philippine market although its share dropped from 41.2% ($8.2 million) in 1969 to 38.1% ($7.1 million in 1971. Germany, Canada, and the United Kingdom ranked well behind Japan with 1971 exports of $1.4 million, $800,000, and $500,000, respectively.

Statistics taken from *Exports, Commodity by Country,* FT-410, an annual publication of the U.S. Census Bureau, show in detail U.S. exports to the Philippines of materials handling equipment in selected years. (See table 3.)

Table 1.—Philippines: Size of the market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972 [1]
Lifting, loading, and conveying equipment			
Production	1.4	1.5	1.6
Imports	16.6	16.2	15.3
Market size [2]	18.0	17.7	16.9
Industrial vehicles			
Production	—	—	—
Imports	3.4	4.1	2.6
Market size	3.4	4.1	2.6
Totals, materials handling equipment			
Production	1.4	1.5	1.6
Imports	20.0	20.3	17.9
Market size	21.4	21.8	19.5

[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports. Exports and re-txports are negligible.

Source: Production values based on Philippine trade sources. Foreign trade values based on Central Bank of the Philippines published data and estimates derived from Japanese and U.S. export statistics.

Specific Sales Opportunities

A recent research study conducted in the Philippines for the U.S. Department of Commerce identified the following items as representing favorable sales opportunities for American manufacturers:

Lifting, Loading, and Conveying Equipment

- Conveyor belts
- Parts for belt and other conveyors
- Pneumatic conveyor pumps
- Yarders
- Hoists
- Aircraft conveyor belt loaders
- Log loaders
- Overhead traveling cranes
- Mobile cranes
- Cranes and other equipment for large containers
- Truck-mounted cranes
- Tree-mounted cranes
- Tow motors
- Industrial two-floor elevators
- Cable-lift stackers and unstackers for plywood and lumber
- Hoisting, rigger, and utility blocks
- Stock pickers

Industrial Vehicles

- Forklift trucks, over 5-ton capacity
- Aircraft tow tractors
- Airport baggage-tow tractors
- Straddle carriers
- Aircraft high-lift commissary trucks
- Pallet trucks
- Grab-lift trucks for drums

Lifting, loading, and conveying equipment.—The growing market for conveyor belts offers promising sales opportunities to American manufacturers, whose products in this line are considered superior in the Philippines. Normal belt widths are between 24 and 48 inches. Although coveyor frames and other parts are fabricated in the Philippines, certain products such as motors and bearings are imported. U.S. gear motors in the 31 to 130-hp. range are in demand and are competitive.

American overhead cranes are highly regarded by Philippine users. Overhead cranes in 5 to 10-ton-capacity are most common, although larger sizes are used in heavy industries. High-capacity mobile cranes are needed in the country's shipping, logging, and metalworking industries. Mobile cranes from the United States, particularly in 10 to 70-ton-capacity, should also find a receptive market because of their durability and unequalled ability to handle heavy loads.

The worldwide trend toward containerization of cargo is expected to accelerate the Philippine demand for large cranes and related equipment. U.S. suppliers are the leaders in the container handling field and are in a good position to benefit from this growing market. The two berths installed for container handling at the new Mariveles Port near Manila indicate the potential of this market. A second pier is planned at this port for 1975-76.

American manufacturers of all types of hoists should find an excellent market in the Philippines. Sales opportunities are especially promising for larger hoists, although U.S. suppliers can compete well in all sizes because of the high quality of their products.

The basically labor-intensive agricultural and manufacturing sectors in the Philippines are moving increasingly toward automation. As a result, a market for pneumatic conveyor pumps for the bulk handling of grain, flour, and chemicals is emerging. Similarly, modernization of the country's warehouses should stimulate demand for stock pickers, especially in pharmaceuticals where a wide variety of items are stocked and distributed. U.S.-made stock pickers can fill this need.

The rapidly growing lumber industry in the Philippines has a continuing need for yarders and log loaders. The sales potential for yarders is excellent, as lumber firms are compelled to go farther into the timber stands in order to find high quality lumber. Philippine loggers, experienced with American equipment, recognize the advanced design and dependability of U.S. loaders.

Industrial vehicles.—American manufacturers of forklift trucks of over 5-ton capacity will find a receptive market in the Philippines. The larger forklifts from the United States are preferred for their durability and quality. Tow motors, like forklifts, are widely used in light manufacturing and heavy industries and will continue to be in demand. U.S. tow motors are thought to be the best available in terms of their ability to pull heavy loads and are expected to find a strong market in industrial, shipping, and aviation sectors. The plywood and lumber industry uses straddle carriers to move finished products off the production line and into storage areas. U.S. straddle carriers are the best sellers because they are designed specifically for use in this industry.

The steady rise in the rate of capital investment in the Philippine airline industry should assure a significant market for aircraft materials handling equipment. Philippine Airlines will require tow tractors of a greater capacity, as well as higher reaching and larger belt loaders and commissary trucks to accommodate the larger jets. The country's major airlines are aware of the advantages inherent in dealing with established companies and prefer American suppliers.

End-User Analysis

The Philippine Government's efforts to increase industrial production and make the country self-sufficient in agriculture should boost demand for materials handling equipment. Among the sectors considered to have a strong demand for MHE&S are lumber and wood products, metal products and machinery, warehousing and shipping, air transportation, and food processing. Overproduction in the Philippine sugar and cement industries, which led to reduced profits, temporarily limited capital investment. Sales of MHE&S should increase as these traditional users recover and reenter the market.

Lumber and wood products.—The forestry and logging sector is vital to the Philippine economy, contributing $345 million, or 5.5%, to the national income in 1971. The increasingly important wood processing industry contributed $44 million during the same year. The lumber and wood products sector is composed of 3,250 firms, including 1,580 companies in forestry or logging; 1,600 in sawmilling or planing; 54 in plywood and veneer; and 17 in pulp and paper. Some 101,800 people are employed in this industry.

Logs probably will continue to dominate the country's wood exports in the 1970's. Log production for 1971 amounted to over 14 million cubic yards, of which 79% was exported. However, log exports are expected to level off during the remainder of the decade because government policy encourages ex-exports of processed products. Mass-housing projects and other construction should push the domestic demand for wood from 4.7 million cubic yards in 1972 to 6.8 million in 1980.

Capital expenditures for logging and sawmill machinery increased 82% between 1969 and 1970 and 64% between 1970 and 1971 to reach a total of about $11 million. The lumber and wood products sector purchased an estimated $7 million worth of materials handling equipment in 1971. This level of demand supposedly was sustained in 1973 and is expected to jump to $9 million in 1974.

The exhaustion of lumber readily accessible to roads and rivers has accelerated the use of advanced equipment and systems for removal of logs from remote forests. Yarders will continue to be in demand

Table 2.—Exports of mechanical handling equipment to the Philippines[1] *by principal suppliers, 1969-71*

(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	6.7	33.7	6.2	34.2	7.7	41.4
Japan	8.2	41.2	6.8	37.6	7.1	38.1
Germany	1.4	7.0	1.4	7.7	1.4	7.5
Canada	.8	4.0	.9	5.0	.8	4.3
United Kingdom	.7	3.5	1.3	7.2	.5	2.7
Others	2.1	10.6	1.5	8.3	1.1	6.0
Total	19.9	100.0	18.1	100.0	18.6	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader caetgory mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities,* Series C, Volume III, 1969, 1970, and 1971, published by OECD, based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

as loggers are forced to go deeper into the jungles and woodlands. Log loaders will be used to a greater extent to speed up the supply of logs for local wood-processing industries and for overseas buyers.

The anticipated growth of domestic processing industries should enhance prospects for straddle carriers to move large masses of finished wood and plywood to storage areas and transportation facilities. A number of firms are also planning a more systematic flow for production of wood products that will boost the demand for conveyor belts and various kinds of conveyors. The need for heavy equipment of all types, especially mobile cranes, will continue strong. Although the Philippine forestry and logging industry has not used consultant engineering services extensively in the past, there is a need for this service in light of the sharp foreign competition in the wood processing industries.

The Insular Lumber Company, headquartered in Makati, Rizal, is one of the largest lumber processors in the Philippines. Since its organization in 1904, the company has geared its production to the processings of logs into rough and planed precut lumber products for export. Its principal processing facilities are located in Barrio Fabrica in the municipality of Sagay. The Board of Investment, in 1971, approved an additional capacity of 15 million board feet of finished lumber products for export and the modernization of equipment used to process the firm's existing capacity of 39 million board feet. Insular constructed an electric-powered sawmill in 1970 in the municipality of Hinobaan, near its logging concession in the south. This mill has an annual pilot capacity of 5.3 million board feet. The company began the construction of a physical plant in 1971 that is scheduled to bring the total southern mill annual capacity to 54 million board feet. Construction has also begun near the Nabulao Gulf, where its drying kiln, planing mills, cooling shed, and boilers will be located.

Insular's primary materials handling equipment includes yarders, log loaders, forklift trucks, mobile cranes, and conveyors, particularly roller conveyors. It is estimated that within the next 2 years the firm will purchase approximately $100,000 worth of materials handling equipment, including rigid column breakdown hoists, a semiautomatic stacking mechanism, a stacker cable lift, and forklift trucks.

Metal products and machinery.—The metal products and machinery sector is expected to continue its pattern of rapid growth. Output increased by 8% in 1971 and 12% in 1972, and should rise by over 10% a year for the next 5 years. The metal products and nonelectrical machinery industry contributed $78 million (1%) to the country's national income in 1971.

In addition, electrical machinery manufacturers contributed $48 million to the national income and transport equipment manufacturers contributed $35 million. The total number of workers employed in the sector in 1971 was 147,000.

The Philippine Government is actively promoting expansion in this sector, which realized $11.8 million in gross domestic capital investment in metalworking machinery in 1971. Emphasis is being placed on increasing local production of motorcycles and other motor vehicles, and the shipbuilding industry has been included in the Government's Fourth Investment Priorities Plan. The country currently has about 1,000 vessels of different types to link its 7,100 islands. However, the bulk of the inter-island traffic is carried by 182 ships, most of which have been in operation for 25 years. Within the past 15 years, shipping operators have acquired 14 additional vessels through the Japanese Reparations Program, and the National Development Company has constructed 12 vessels. There are at present 28 new applications to purchase 134 oceangoing vessels through the National Development Company. Because the National Economic Council will no longer approve the acquisition of more vessels under the Reparations Program, a number of companies are planning new shipbuilding facilities or the expansion of existing ones. Capitol Shipping Lines, the Simeon Policarpio Shipyard & Shipbuilding Corporation, and the Freeport Shipyard and Engineering Corporation are among these companies.

The metal products and machinery sector purchased an estimated $3 million worth of materials handling equipment in 1971; forecasts put this figure at $4 million in 1973 and $5 million in 1974. Demand will be particularly strong for forklift trucks of over 5-ton capacity, hoists, overhead traveling cranes, tow motors, and mobile cranes. These products will be required by heavy equipment manufacturers and cast iron producers as these industries become more involved in extensive assembly operations.

The Marsteel Corporation in Quezon City is the Philippines' fourth largest steel company, with sales of $7.7 million and assets of $14.1 million in 1971. Marsteel's materials handling equipment primarily includes tow motors, overhead traveling cranes, mobile cranes, and hoists. The firm is presently undergoing an expansion program and plans to spend about $3.5 million over the next 3 years on building an additional plant and acquiring new equipment. Approximately $150,000 of this will be allocated to materials handling equipment.

Warehousing and shipping.—Transportation services supplied $122 million, or 4%, of the Philippines' national income in 1971, and communications and storage services accounted for $20 million. Approximately 37,000 workers are employed in this sector. The Philippines has numerous ports scattered throughout the islands. South Harbor, in Manila, is the main foreign shipping terminal. It provides berths for 14 oceangoing vessels and is served with forklift trucks, motor trucks with lifting cranes, electric floor-tractors, and heavy-duty cranes. Cebu, the leading inter-island shipping center, is also important for overseas vessels.

There is a marked trend to improve Philippine ports and warehouses, and public and private interests alike are making substantial investments for this purpose. Shipside, Inc., a subsidiary of Lepanto Consolidated Mining Company, can berth four oceangoing vessels at its port facilities located north of Manila. The facilities were designed to relieve the Manila port traffic, and materials handling equipment in use includes a fleet of forklifts with capacities ranging from 6,000 to 16,000 pounds each and a mobile crane with a 25-ton capacity. Future plans call for a belt conveyor system for moving bulk cargo to and from ships at dock. The Philippine Government is building an industrial park with warehouses and other facilities at Mariveles Bay in Bataan Province. The wharves will have three berthing facilities, each equipped with six 45-ton cranes, and will handle foreign trade.

The major area of growth will occur with the advent of containerization in the shipping industry. Advanced equipment will be needed to handle the containerized cargo. In all, the warehousing and shipping sector was expected to spend $6 million on materials handling equipment and systems in 1973 and $7 million in 1974. Forklift trucks with over 5-ton capacity, mobile cranes, cranes and other equipment to handle large containers, conveyor belts, and parts for belt conveyors will be needed. In addition, pneumatic conveyors will be used more widely in the Philippines for the bulk-handling of grains and chemicals.

The Luzon Stevedoring Corporation, with sales of about $34 million and assets of $53 million in 1971, is the largest brokerage and warehousing company in the Philippines. Equipment used at one of the firm's yards includes three Hyster 7-ton forklift trucks, one Pettibone 5-ton forklift truck, a Swiss electric-drive jib crane, two floating cranes with 19-ton capacities, one land crane with 25-ton capacity, and other smaller forklift trucks. The firm's entry into bulk-handling of grains necessitated the purchase of pneumatic grain elevators or pumps. The present pumps have a capacity of 25 tons per hour and the company plans to increase the capacity of each pump to 35 tons per hour. Additional expenditures are anticipated for pneumatic equipment and additional cranes for container handling facilities. Purchases of materials handling equipment by Luzon Stevedoring should total at least $100,000 over the next 2 years.

Air transportation.—The Philippine archipelago is naturally suited to the development of commercial aviation. Gross domestic capital investment in aircraft transport equipment has increased sharply in recent years, going from $6.1 million in 1969 and $19 million in 1970 to $27.6 million in 1971. The combined assets of the three major domestic carriers, Philippine Airlines, Filipinas Orient Airways, and Air Manila, totaled $96.6 million in 1971, up 16% from the previous year's value of $83.1 million. There are presently 92 public airports in operation, including the international airport in Manila; 4 alternates in Mactan, Zamboanga, Laoag, and Davao; 6 trunkline airports; 50 secondary airports; 21 feeders; and 10 rural airports.

The prospects for growth continue to be good, despite financial losses suffered by the airlines in recent years. All major Philippine airlines are receptive to the use of advanced materials handling equipment and systems, and expenditures on such equipment should continue to rise as new airports are built. The airlines spent an estimated $2 million on materials handling equipment and systems in 1971, and it is expected that purchases will reach $3 million in 1974. Demand will be especially strong for aircraft tow tractors, aircraft conveyor-belt loaders, airport baggage tow tractors, aircraft high-lift commissary trucks, and parts of belt conveyors. Normal sales for aircraft tow tractors, conveyor-belt loaders, towing tractors, and lift loaders are on the order of one or two a year, but larger purchases may also be made.

Philippine Airlines, which ranked 11th among all Philippine corporations with sales of $52 million in 1971, is the leader in the use of modern materials handling equipment. The company uses 24 forklift trucks, 47 tow tractors or tugs, 16 lift loaders, two pallet loaders, and two electric cargo-lift trucks. Within the next 2 years, the carrier plans to purchase about $158,000 worth of materials handling equipment, including an aircraft tow tractor, a conveyor-belt loader, a baggage tow tractor, and a high-lift commissary truck.

Food processing.—The contribution of the food processing industry to the Philippine national income amounted to 7% in 1971. The country is highly agricultural, with expanding possibilities for food processing industries. Food manufacturers' net value added was $347 million in 1971, up 20% from $288 million a year earlier. Beverage manufacturers contributed an additional $89 million to the economy in 1971. Over 128,000 workers are involved in food processing and about 31,000 are in the beverage industry.

The Philippine Government is promoting the growth of domestic food processing in order to increase exports and make the country self-sufficient in foods. Processed fruits and vegetables and canned meat and fish are eligible for investment incentives under the Fourth Investment Priorities Plan. Food

Master, Inc., for example, has been granted pioneer status by the Philippine Board of Investment for the manufacture of frozen fruit packs and other fruit products.

The potential applications of materials handling equipment and systems to the Philippine food processing are twofold. First, equipment will be needed where heavy loads are involved and, secondly, integrated operations will be required to move perishable products quickly from the field into canning runs. The sector spent an estimated $2 million on MHE&S in 1971, and its annual expenditures should jump 50% to $3 million by 1974. The demand should be particularly strong for conveyor belts, parts of belt conveyors and other conveyors, pneumatic conveyor pumps, overhead traveling cranes, and overhead conveyors. Also, the Government's effort to make the country self-sufficient in rice production should increase the demand for grain-handling equipment, such as grain dryers. Present projections indicate that by 1975 about 700 grain pumps will be required, in addition to other types of grain conveyors. Yearly purchases of overhead conveyors and cranes for fruit and poultry processing will be on the order of 10 to 15 units by 1975.

The Philippine Packing Corporation, with offices in Manila, is one of the largest packing firms in the country, with sales exceeding $20 million in 1971. The firm processes and cans a number of fruits grown on its plantations in the Philippines. Philippine Packing uses trucks to haul its fruits to rail transportation, and the truck bodies are then placed on the rails. Conveyor belts carry the fruit to workers for processing, and roller conveyors move the finished products. Lift trucks are used for storage and movement to shipping facilities. The firm anticipates considerable expansion of its facilities, and expenditures on materials handling equipment should total $100,000 during the next 2 years.

Competitive Environment

Almost all domestic firms engaged in the production of materials handling equipment are relatively small; together they account for only about 6% of the total market. Most of the domestic manufacturers are active in the area of conveyors and conveyor parts. These include Aetna Steel Industries, Inc., (Rizal); General Hardware Products, Inc., (Quezon City); G. A. Machineries, Inc., (Manila); Quentin Industries (Quezon City); P. G. Tomas & Company, Inc., (Manila); and Atendidos Heavy Industries (Quezon City). In addition to producing portable belt conveyors, Boltex Engineering Works (Manila) also manufactures trough idler rollers. Urrapid, Inc., (Makati, Rizal) offers loaders and bucket elevators as well as conveyors. Oberly & Company, Inc., (Quezon City) supplies construction elevators, hoists, and conveyors. Some large foreign-owned companies, such as Honiron or Atlantic, Gulf and Pacific, also fabricate materials handling equipment on a periodic basis.

Local production, projected to grow at an annual rate between 6 and 9% through 1974, is expected to remain limited to conveyors, hoists, and construction elevators. The Government's policy of encouraging domestic industry in general is the major factor in the anticipated increase in domestic production of materials handling equipment from existing plants. As part of a general tightening of economic policy, Government agencies have been instructed to purchase from Philippine sources whenever feasible. The impact of this policy is not expected to affect the materials handling equipment market significantly because government agencies are not the major end-users of this equipment.

The United States faces its strongest competition in the Philippine import market for materials handling equipment from Japan. Such Japanese firms as Toyota Motor Sales Company, Ltd., and Komatsu are active suppliers of forklift trucks. Japan's best position lies in smaller forklift trucks, conveyor belts under 200 feet long, and gear motors below 30 horsepower. Mitsubishi Shoji Kaisha, Ltd.; Daifuku Machinery Works, Ltd., Toyo Umpanki Company, Ltd.; Nippon Hoist Company, Ltd.; and Hitachi, Ltd., are a sampling of the Japanese companies selling MHE&S to the Philippines.

Materials handling equipment imported into the country is subject to ad valorem duty rates ranging from 10 to 20%. Leased equipment is valued on the same basis as other imported equipment. In addition, materials handling equipment and systems are subject to a 7% tax. There is also a minor stamp tax on bills of lading or receipts. Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-238), U.S. Department of Commerce, Washington, D.C. 20230.

Sales in the Philippines are dependent upon the terms of financing as well as the price of the equipment. Terms from large suppliers usually are 10 to 20% down, with payments stretching over 3 to 5 years at annual interest rates of 12 to 15%. Because of tight money and high interest rates, more and more agents are offering materials handling equipment for rent or lease.

Technical personnel are generally available for support of sales and service operations. Factory-trained service personnel in some cases make periodic inspection of customers' equipment. Other distributors provide job-side training of machine operators and maintenance mechanics for customers. Warranties, usually including spare parts and labor, range from 6 months to 1 year.

American manufacturers, already respected in the

Table 3.—U.S. exports to the Philippines of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	5	44	81	383
Parts for above	31	12	37	77
Other cranes, unmounted	116	220	1,184	481
Other crane parts	67	62	107	310
Subtotal, cranes and parts	219	338	1,409	1,251
Hoists	233	485	533	813
Parts for hoists	115	130	130	95
Derricks	—	544	56	—
Winches	780	422	2,261	1,130
Parts for above, etc.	770	541	778	699
Hydraulic jacks, parts	73	72	39	13
Other jacks and parts	72	27	18	—
Other lifting equipment	76	98	72	666
Subtotal, lifting equipment	2,119	2,319	3,887	3,416
Elevators, escalators	28	27	9	60
Parts for above	94	38	35	22
Gravity conveyors	85	1	59	49
Overhead conveyors	14	—	34	—
Pneumatic conveyors	15	1	4	—
Wheeled conveyors	—	—	—	—
Other conveyors	422	286	89	39
Parts for conveyors	430	554	629	504
Subtotal, conveyors and parts	1,088	907	859	674
Used and rebuilt tractor shovel loaders (TSL)	266	93	52	—
Front-end loaders for mounting on TSL	3	3	—	—
Subtotal, loaders and used TSL	269	96	52	—
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	—	18	—	—
4-wheel drive, -1	12	38	30	54
4-wheel drive, 1-1.49	75	—	—	—
4-wheel drive, 1.5-1.99	255	55	32	—
4-wheel drive, 2-2.49	102	44	15	60
4-wheel drive, 2.5-3.49	270	205	172	262
4-wheel drive, over 3.5	676	914	418	347
Subtotal, wheeled TSL	1,390	1,274	667	723
Total, lifting, loading, and conveying equipment	5,085	4,934	6,874	6,064
Industrial vehicles (IV)				
Walking and powered IV	43	10	3	—
Electric-powered IV	1	19	2	—
Gasoline-powered IV	475	340	190	134
Other-powered IV	170	191	71	26
Portable stackers	—	13	3	22
Parts for above	290	372	376	416
Total, industrial vehicles	979	945	645	598
Total, materials handling equipment	6,064	5,879	7,519	6,662
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 engine horsepower	9	—	—	—
45-59.9 engine horsepower	21	—	—	28
60-89.9 engine horsepower	122	—	—	35
Over 89.9 engine horsepower	86	125	—	121
Subtotal, tracklaying TSL	238	125	—	184
Underground loaders	13	—	53	—
Parts for above	124	88	33	114
Oil field rod-lift equipment	—	3	—	—
Oil fluid derrick, parts	2	—	—	—
Other fluid lift equipment	1	—	1	—
Farm elevators	4	—	20	—
Parts for above	—	—	6	—
Automobile lifts	219	136	57	—
Underground mine conveyors	—	—	—	—
Subtotal, other equipment	363	227	170	114
Total, tracklaying and other equipment	601	352	170	298
Grand total, mechanical handling equipment	6,665	6,231	7,689	6,960

Source: *Exports, Commodity by Country,* FT-410, 1969, 1970, 1971, and 1972. U.S. Department of Commerce, Bureau of the Census.

Philippines, could improve their position further by reducing delivery time, providing more flexible financing, and engaging in large-scale project development. A package approach to selling MHE&S, consisting of the initial feasibility study, financing, planning, and equipment, would be well received by Philippine customers.

Technical Requirements

According to the Philipine Bureau of Standards, there are no required standards for materials handling equipment and systems. Detailed information on technical requirements can be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

The principal system of weights and measures used in the Philippines is the metric system. Electrical power characteristics are generally 110/220 volts, 60 hertz, 1 and 3 phases, 2 and 3 wires.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

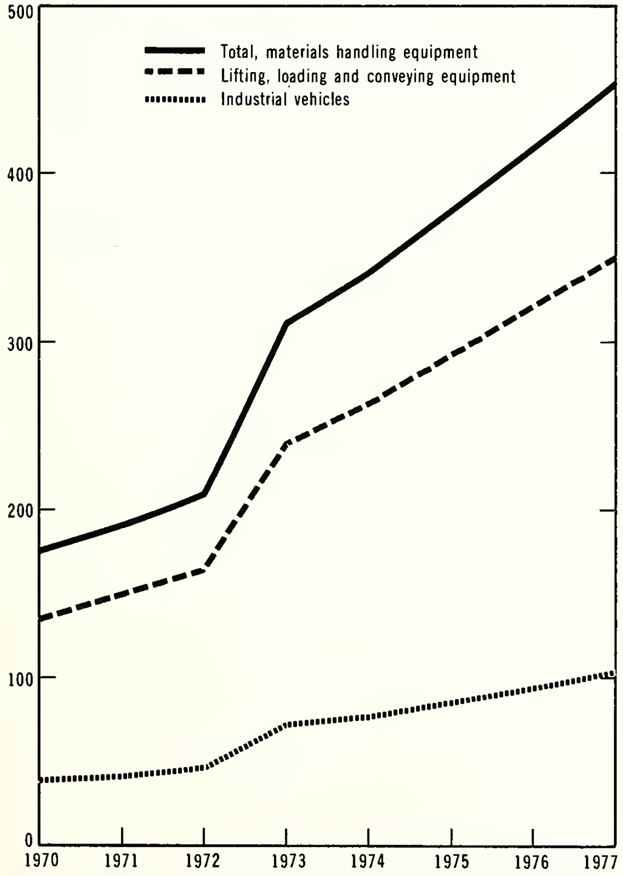
"The Market for Materials Handling Equipment and Systems in the Philippines," DIB 73-12-513, March 1973.

Poland

The advent of containerization and renewed emphasis on modernizing and automating production processes and handling procedures is expanding the market in Poland for materials handling equipment and systems (MHE&S). The market for such equipment was valued at $210 million in 1972 (see table 1) and is expected to reach $453 million in 1977, representing a growth rate of 16.5%.

Poland: Materials handling equipment market, 1970-72 and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by U.S. Department of Commerce, Office of International Marketing, official Polish statistics, and trade estimates.

Lifting, loading and conveying equipment accounted for about 75% of the materials handling equipment market in 1972 and this sector is expected to grow at an average annual rate of 17.6% through 1977, when sales are projected to be $349 million. The market for industrial vehicles is expected to grow at an average annual rate of 16% between 1972 and 1977, going from $46 million to $104 million.

Purchasers of MHE&S in Poland are required to buy from domestic producers or from COMECON [1] suppliers whenever possible.

Poland and other COMECON countries do not produce heavy cranes and specialized equipment used in containerization and do not produce advanced handling systems. Foreign suppliers other than COMECON countries provided 14% of the import market in Poland in 1972. Polish imports of materials handling equipment rose from $24 million in 1970 to $29 million in 1972 and are forecast to reach $57 million in 1977.

Although U.S. exports of mechanical handling equipment are not significant at the present time, they are expected to increase during the next few years as trade relations improve between the United States and Eastern European nations.

The United Kingdom was the leading Western supplier of mechanical handling equipment in the 1969-71 period, accounting for about 20% of Poland's imports (see table 2). Germany ranked second during the same period with 18% of the import market. Other leading Western suppliers were Finland and France.

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[1] COMECON—Council of Mutual Economic Assistance, comprised of the U.S.S.R., Bulgaria, Czechoslovakia, Hungary, Poland, Romania and East Germany.

Specific Sales Opportunities

A recent market research study conducted in Poland for the U.S. Department of Commerce suggests the following items as representing good sales opportunities for American manufacturers:

Lifting, Loading and Conveying Equipment

- Conveyors
- Cranes
- Winches
- Integral tractor-shovel loaders, wheel-type, with bucket capacity of 3.5 cu. yd. or more
- Parts for lifting, loading and conveying equipment

Industrial Vehicles

- Floor trucks

Systems and Specialized Equipment

- Container handling equipment
- High bay warehouse systems
- Palletization and depalletization equipment
- Stock handling equipment

Lifting, loading and conveying equipment.—Poland produces all types of cranes with the exception of railway cranes, giant bridge cranes and container cranes. However, domestic production cannot satisfy the country's growth requirements. Poland also produces a wide variety of conveyors, but not in sufficient quantities for domestic needs.

Poland has some 2.5 million pallets, and users will purchase an additional 2.5 million by 1975, despite reports that only 20% of the existing pallets are being fully utilized because of a shortage of materials handling equipment and because of inefficient stacking and palleting techniques.

Industrial vehicles.—According to official Polish foreign trade statistics, imports accounted for 22% of the Polish market for floor trucks in 1972. The growth of palletization and containerization are expected to contribute to increased need for such vehicles.

Systems and specialized equipment.—Advanced materials handling systems and specialized equipment are not widely utilized at present in Polish industry, with the exception of the motor vehicle manufacturing industry. However, Polish planners are beginning to give increased attention to modernizing materials handling procedures in order to boost industrial production. This trend should lead to increased imports of advanced MHE&S, including high-bay warehouse systems and stock handling equipment. It is estimated that 9% of the Polish market for systems and specialized equipment was supplied by imports in 1972.

End-User Analysis

The market for materials handling equipment and systems in Poland is in the early stages of development. Only one out of every four people engaged in lifting, loading and transportation functions utilizes materials handling equipment. Outdated materials handling techniques have been recognized as a major handicap to the growth of Polish industry, and Polish officials have expressed interest in cooperating with Western companies in solving some of Poland's materials handling problems.

Five areas of industry in Poland—food, metal processing, wholesale trade, transportation , and chemicals—are among those offering the greatest potential market for materials handling equipment and systems. Capital investment in these five industries combined was estimated at $10 billion in 1972.

Food industry.—Some 13,000 plants, representing 25% of Poland's 51,200 factories, are involved in food production. These plants accounted for

Table 1.—Poland: Size of market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972
Lifting, loading and conveying equipment			
Production	138.5	153.0	168.3
Imports	15.4	17.5	18.8
Exports	17.8	21.0	23.6
Market size [1]	136.1	149.5	163.5
Industrial vehicles			
Production	38.1	41.8	43.4
Imports	8.3	7.2	10.6
Exports	6.8	6.8	7.7
Market size	39.6	42.2	46.3
Totals, materials handling equipment			
Production	176.6	194.8	211.7
Imports	23.7	24.7	29.4
Exports	24.6	27.8	31.3
Market size	175.7	191.7	209.8

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[1] Market size equals production plus imports minus exports.

Source: Production data based on *Rocznik Statystyczny 1972.* Foreign trade data based on *Rocznik Statystyczny Handlu Zagranicznego 1972.*

Table 2.—Exports of mechanical handling equipment to Poland by principal Western suppliers, 1969-71[1]
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States[2]	—	—	—	—	—	—
United Kingdom	1.1	17.7	1.3	20.6	1.8	22.8
Germany	.6	9.6	.7	11.1	2.4	30.4
France	1.9	30.6	.4	6.3	.3	3.8
Finland	.5	8.1	1.5	23.8	.5	6.3
Others	2.1	34.0	2.4	38.2	2.9	36.7
Total	6.2	100.0	6.3	100.0	7.9	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Country Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment.

[2] U.S. exports are minimal; see table at end of Country Survey for values based on U.S. export statistics.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by the Organization for Economic Cooperation and Development (OECD), based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada and Japan.

18% ($9.5 billion) of the country's total industrial production in 1972. The annual capital investment in the same year was $330 million, representing about 3.3% of the total capital investment in Poland. Capital investment is expected to exceed $50 million annually by 1980.

The development of the food industry in Poland is receiving priority, and export quotas are being increased. The main problems affecting the expanded application of materials handling equipment are lack of systems concepts and know-how among planners and operators and a lack of convertible currency funds.

Present costs of transport and handling activities for several segments of the food industry, expressed as a percent of total production costs, are: vegetables, 40 to 60%; fish processing, 60 to 70%; and bakery products, 70 to 80%. There is a great need to reduce these costs. Since domestic producers can supply only 50% of the materials handling equipment required, the Polish food industry can be expected to seek equipment abroad, particularly materials handling equipment and systems for warehouses, high-level deep-freeze shelving, and combined conveying and packing equipment.

The present Five Year Plan (1971-1975) calls for the allocation of 75% ($248 million in 1972) of the food industry's total annual investment capital for imported equipment. Although these funds are not specifically earmarked for certain types of imported equipment, Polish sources indicate at least some of the money will be spent for the following:

- Conveyors for bottling lines
- Conveyors for poultry slaughtering lines
- Conveyors for meat packers
- Complete deep-freeze shelving equipment

In general, the policy of Polish industrialists is to purchase equipment as part of turnkey projects rather than as single units. Polish authorities repeatedly express a desire for the sophisticated equipment and know-how available from Western companies.

The Ministry of Food Industry in Poland plans to build four new meat processing plants by 1975. The machinery and equipment will come from foreign suppliers. The Polish Government also plans to build new factories for the production of powdered milk, cheese and butter through turnkey projects handled by foreign firms.

Metal processing.—Approximately 115 factories in Poland are engaged in metal processing. Some 250,000 people are employed in the industry, which had an annual capital investment in 1972 of $570 million. The present Five Year Plan calls for investment of $2.6 billion for modernization of old foundries and the construction of new foundries.

Capital investment for the non-ferrous metal industry in the present Five Year Plan, amounts to $440 million, of which $230 million is allocated for purchasing machines and equipment, including materials handling equipment and systems.

A major problem in the metal processing industry is the lack of adequate transport equipment for red hot iron, and it is believed that suitable equipment for this specialized activity will not be available soon from domestic production. There is a general shortage of equipment and engineering know-how in the industry. The equipment in greatest demand at present includes heavy front end and side-loading trucks and trailers, lowlift trucks and semi-trailers, and forging manipulators.

The largest project to be carried out by the Ministry of Heavy Industry under the present Five Year Plan will be a new steel mill in Katowice.

Wholesale trade.—Poland has 11,120 wholesale warehouses employing 95,800 people. Capital investment in 1972 was $130 million. Many of the warehouses are too small to effectively utilize modern materials handling equipment, but larger warehouses are being built as centralized depots for consumer goods at county level and as storage areas in industrial plants, municipal facilities and elsewhere.

The present demand is focused on the installation of high bay warehouses with all associated equipment, such as elevators, forklift trucks and elevator trucks. In addition, the wholesale trade is looking to the introduction of electronic data processing equipment to improve the present methods of storing, transporting and distributing industrial products. The almost complete lack of domestic consulting and engineering services in the materials handling equipment and systems area in Poland points out the country's dependence upon foreign suppliers to fill this important void.

Transportation.—The transportation industry in Poland employs 668,000 people. The industry's capital investment in 1972 was $1.3 billion, representing 13% of the country's capital investment for the year. Outdated transportation systems have delayed the adoption of modern materials handling techniques, but the growing importance of containerization should help push capital investment in transportation to new levels.

Polish requirements for materials handling equipment and systems in the transportation industry will center primarily on 61 container terminals, two of which are port terminals in Gdynia and Szczecin. The remaining are railroad terminals which will be located in the following cities: Bielsko-Biala, Bydgoszcz, Gdansk, Gdnia, Gliwice, Katowice, Krakow, Lodz, Lublin, Poznan, Szczecin, Warsaw, Wroclaw, and Zielona Gora.

The materials handling equipment to be used in these terminals must be capable of handling 20-foot and 40-foot containers. This will require the purchase abroad of gantry cranes and low-capacity and heavy-capacity lift trucks, for which there is no domestic production.

Because of the international aspect of containerization, Poland realizes the necessity for developing a system compatible with that of other countries if it is to continue increasing its foreign trade.

The Ministry of the Commercial Navy is responsible for the construction of the new container terminals in the harbors of Szczecin and Gdynia. The Ministry of Communications has the responsibility for constructing the 59 railroad terminals.

Chemical industry.—The Polish chemical industry consists of 1,270 factories and employs 223,300 persons. The value of production was $5.3 billion in 1972, and the industry's capital investment was $530 million.

The Polish State Planning Commission has established 13.9% as the planned annual average gross rate of increase for the chemical industry. Planned capital investment for the industry is $7.5 billion in the period 1971-75 and $15 billion in 1976-80. Chemical firms' planned purchases of materials handling equipment and systems under the present Five Year Plan (1971-75) amount to $20 million.

In an effort to cut transportation costs and accelerate the movement of goods, the chemical industry in Poland plans extensive expansion in the use of pallets and containers. Approximately 1,000 electro-carriages, 450 diesel carriages, 1,000 lift trucks, 400,000 wooden pallets, and 80,000 special pallets will be purchased by the industry by 1975. A major portion of the requirements for lift trucks, belt conveyors, gantry cranes, fork lifts and winches will be supplied from domestic production.

Since the chemical industry has an absolute priority over other Polish industries in purchasing domestic equipment, imports of materials handling equipment apart from that purchased as part of turnkey projects have been nominal. However, the chemical industry will continue to purchase materials handling equipment and systems from Western countries in package deals. Foreign suppliers of turnkey projects have been Dupont de Nemours (Switzerland), Lurgi (West Germany), and Mitsui (Japan).

Competitive Environment

Materials handling equipment in Poland is produced in plants aligned in various production unions, which in turn are subordinated to industry-ministries such as the machine manufacturing ministry and the ministry for heavy industry.

Although many of the shortcomings of the Polish materials handling equipment industry have been recognized—for example, poor intercompany communications, ineffective production, lack of specialization, and absence of standardized machine elements—no recent major improvements have been made with one exception. That was the establishment in 1972 of the enterprise TECHMATRANS, which unites several previously independent plants producing equipment for transporting goods and handling stock.

The materials handling industry is expected to become one of the fastest growing sectors of the nation's economy as Government planners look for methods of improving industrial productivity.

Because of the "buy national" and "buy COMECON" policies, imports from Western countries will depend to some extent on the level of Polish and COMECON production of materials handling equipment and systems. However, since neither domestic nor COMECON production is expected to meet Poland's requirements in the foreseeable future, imports from Western countries will continue to be needed.

With the exceptions of railway cranes, giant bridge cranes and container cranes, Poland produces every type of crane required by the nation's industry. Even so, domestic producers are unable to supply the quantities needed; even standard cranes are not available in sufficient numbers, due largely to relatively high exports.

The FAMAK factory in Kluczbork produces container cranes, bridge cranes, dockyard cranes and cranes for bulk and loose materials. This plant has been receiving technical assistance from the Belgian firm ABR since 1970. Although the factory is one of the largest of its kind in Poland, it is unable to meet the country's requirements for the equipment it produces.

An increase of 10 to 12% in annual output is planned, but production increases are difficult because of limited supplies of materials and a slow rate of technical innovation. Currently, 20% of the plant's production is being exported to Austria, Denmark, Finland, East Germany and Czechoslovakia.

Other domestic producers of cranes are:

Fabryka Maszyn Budowlanych, Glogow—automotive cranes, tower cranes.
Fabryka Urzdzen Transportowych, Suchedniow—small cranes.
Fabryka Urzadzen Dzwigowych, Minsk Mazowiecki—dockyard cranes, ship cranes.
Kombinat Huta Stalowa Wola, Stalowa Wola—mobile cranes, automotive cranes.
Lodzkie Zaklady Maszyn Budowlanych, Lodz—small cranes for internal transport.
Mostostal, Warsaw—gantry cranes, tower cranes.
Przedsiebiorstwo konstrukeji Stalowych i urzadzen Przemyslowych Mostel, Zabrze—tower cranes.
Slupska Fabryka Urzadzen Transportowych, Jezierzyce—tower cranes.
Szczecinska Fabryka Maszyn Budowlanych Fambud, Szczecin—tower cranes.
Zaklady Mechaniczne w Labedy/Gliwice—mobile cranes, automotive cranes, crawler cranes.
Zaklady Sprzetu Budowlanego, Gorzow Wielkolski—gantry cranes.
Zaklady Sprzetu Budowlanego, Solec Kujawski—gantry cranes.

Polish production of lever jacks is mainly concentrated in the technical equipment plants in Lodz and in Mostostal.

The Zremb plant in Gniezno produces freight and passenger elevators under license by the Swedish firm ALIMAK. The Zremb plant specializes in the production of elevators for domestic use and export. The Soviet Union buys 70% of the plant's production. Elevators are also exported to East Germany, Czechoslovakia, Bulgaria, Rumania, Yugoslavia, and Venezuela.

The Zaklady Urzadzen Dzwigowych/ZUD plant is the only domestic manufacturer of electrical hoists and lifts. The majority of elevators built in this plant are produced under license from the Swedish firm ASEA-Graham. According to a plant report, ZUD's research capabilities are considered inefficient and the use of Western know-how has been suggested.

Forklift trucks are produced in the plants at Stalowa Wola, Suchniow and Zremb. The Stalowa Wola plant is the most important producer and has long experience in building industrial transport vehicles. Bulgaria is the main producer of lift trucks within the COMECON and is expected to supply 9,000 such trucks to Poland during the period 1970-75.

Manually operated lift trucks for transporting pallets are produced in Poland at the Zaklady Maszyn Zawidow plant. Electric lift trucks are imported from Bulgaria.

Purchase of single machines or units generally are cash transactions. Imports of complete lines or systems are subject to financing. Polish foreign trade organizations currently offer a maximum of 6% interest on financing. The amount of down payments represent 10% of the total cost. In some cases, Polish traders seek to finance part of the transactions by barter deals. While such arrangements tend to facilitate the closing of contracts, they are not absolutely essential. A few U.S. manufacturers are currently engaged in barter business with Eastern European countries. Payments are made to the supplier directly from the Trade Bank (Bank Handlowy) of Warsaw.

Imports to Poland are not subject to customs duties. There are no tariff barriers concerning the importation of materials handling equipment and systems into Poland, nor are there any taxes or other charges levied. Information on importing MHE&S into Poland may be obtained from the Domestic and International Business Administratio (DIBA-554) U.S. Department of Commerce, Washington, D.C. 20230.

There is a shortage of competent technical personnel to support sales and service operations in Poland. Although there are organizations offering such support, the personnel are often inadequately trained. U.S. suppliers who engage Polish agents should train the agent's personnel, preferably in the United States.

Warranties should be clearly defined, with the period of time generally not exceeding 12 months. Polish authorities seldom accept warranties for less than six months.

Despite the fact that potential end-users in Poland are usually not adequately informed as to the performance capabilities and other features of U.S. materials handling equipment and systems, there is a general appreciation in Poland of American technology and of the quality of American equipment. U.S. suppliers should make known to Polish industry and government officials the specifications and capabilities of the various types of modern equipment and systems that are available. Although advertising in Polish trade journals and direct mail campaigns may be effective, trade representatives believe that personal contact between U.S. suppliers and Polish Government authorities and end users is extremely important.

Technical Requirements

The characteristics of Poland's electric power supply are 220/380 volts, 50 hertz, 1- and 3-phase, 2- and 4-wire. The metric system of weights and measures is used exclusively. There are no special standards for imported materials handling equipment, Detailed information on technical requirements may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

The following official statistics taken from the U.S. Bureau of the Census annual publication, *Exports, Commodity by Country, FT-410,* show U.S. exports of mechanical handling equipment to Poland in selected years. Values are in thousands of dollars.

Brief Description of Product	1969	1970	1971	1972
Lifting, loading and conveying equipment	3	1	—	121
Industrial vehicles	1	—	27	14
Total, mechanical handling equipment	4	1	27	135

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

"The Market for Materials Handling Equipment and Systems in Poland," DIB 73-12-502, June 1973.

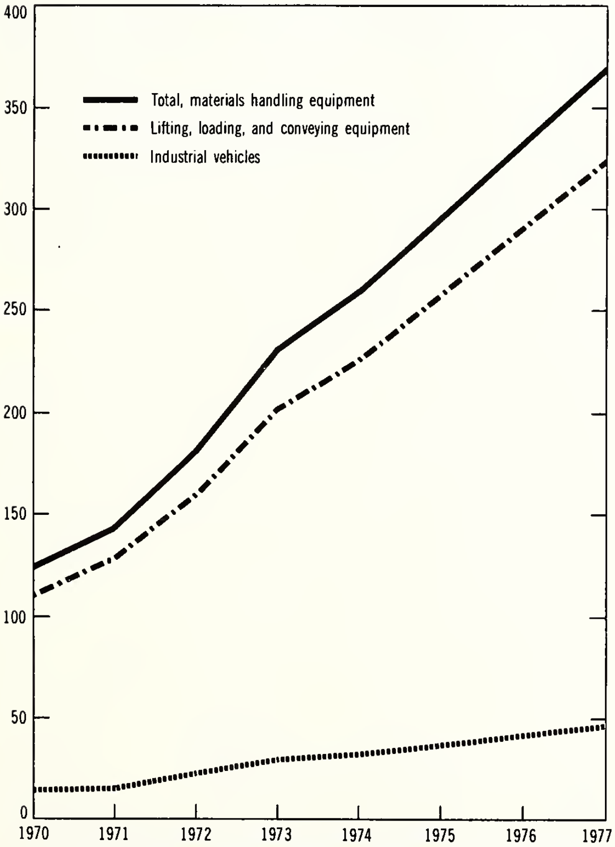
Spain

The market for materials handling equipment and systems (MHE&S) in Spain is forecast to grow at an annual rate of more than 15% during the 1972-77 period. The market, which totaled $181 million in 1972 (see table 1), is expected to reach $368 million in 1977.

The Spanish economy achieved a real growth rate of 7.5% in 1972. The continuing strength of the economy is expected to lead to greater expenditures for capital improvements. Increased purchases of materials handling equipment should result from the construction of new and larger manufacturing and distribution facilities and from industry efforts to increase productivity in the face of rising labor costs.

Spain: Size of market for materials handling equipment, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by the Office of International Marketing, U.S. Department of Commerce, official Spanish statistics, and trade estimates.

Spanish expenditures for lifting, loading, and conveying equipment in 1972 stood at more than $158 million, while almost $23 million was spent on industrial vehicles. Lifting, loading, and conveying equipment is expected to account for $323 million (87%) of total MHE&S expenditures in 1977, and industrial vehicles for $45 million.

Approximately one-third of Spain's requirements for materials handling equipment is met by foreign suppliers. Imports of such equipment, which totaled $67 million in 1972, are expected to nearly double by 1977, exceeding $130 million.

Exports of American-made *mechanical* handling equipment to Spain totaled $5.8 million in 1971, representing a 15.1% share of the import market for this equipment (see table 2). American suppliers are expected to slightly improve their position in this market during the 1972-77 period; U.S. export sales of more than $20 million are forecast in 1977.

Germany is Spain's leading foreign supplier of mechanical handling equipment. German products accounted for $14.2 million, or 37% of Spain's total 1971 imports of this equipment. France accounted for 15.4% of the 1971 mechanical handling equipment import market, while Sweden supplied 9.1% and Italy 7.8%.

Statistics taken from *Exports, Commodity by Country,* FT-410, an annual publication of the U.S. Census Bureau, show in detail U.S. exports to Spain of *materials* handling equipment in selected years (see table 3).

Specific Sales Opportunities

The Spanish economy demonstrated its fundamental buoyancy in 1972 by recovering with renewed vigor from a slowdown that reached its low point in 1971. The resulting surge in industrial production, investments, and imports is creating new sales prospects for American suppliers of materials handling equipment and systems.

Recent market research conducted in Spain for the U.S. Department of Commerce identified the following products as offering favorable sales opportunities for American manufacturers.

Lifting, Loading, and Conveying Equipment

- Conveyors
- Cranes
- Monorails
- High-capacity vacuum lifting equipment

Industrial Vehicles

- Transtackers for high-rise warehouses
- Forklifts for handling ship/rail/truck containers
- Narrow-aisle powered trucks
- Side-loading powered trucks

Systems and Specialized Equipment

- Electronic equipment for speed and load control
- Package and container coding and decoding systems

Several factors have contributed to the substantial increase in the Spanish market for materials handling equipment and systems evidenced since the mid-1960's. Foremost among these has been the zooming upward trend in labor costs; the industrial wage index in 1972 reached 333, more than triple the level of the base year of 1963.

A tight labor market is resulting from the diminishing flow of surplus manpower from the agricultural sector. It will take several years, however, before manpower costs will reach the point where widespread automation of production and distribution begins to be justified.

Spain's use of materials handling equipment and systems has also been influenced by the emergence of a more dynamic attitude on the part of the country's businessmen and industrialists and by technological advances achieved in the United States and elsewhere.

For example, large sums have been spent on equipment needed to adapt Spain's seaport and railroad facilities to the requirements of containerized shipping. Furthermore, industry is making steady progress in modernization and structural integration.

Coming to the fore are larger, more financially strong enterprises that will need more elaborate and complex types of materials handling equipment and systems.

Spanish customers, concerned about the durability of equipment, find that the United States is the best source for high-capacity conveyors, cranes, and vacuum lifting equipment. There is substantial demand, too, for American-made materials handling equipment parts to be incorporated in locally manufactured products. These include stainless steel chains, timing belts, power-grip pulleys, and components for beverage bottling equipment. Monorails that incorporate advanced instrumentation are also of interest.

U.S. manufacturers lead other foreign suppliers

Table 1.—Spain: Size of market for materials handling equipment, 1970-72

(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	83.4	100.9	121.0
Imports	35.8	43.3	51.9
Exports	8.3	15.8	14.3
Market size[2]	110.9	128.4	158.6
Industrial vehicles			
Production	5.7	6.4	8.1
Imports	7.8	7.9	15.0
Exports	.2	.5	.4
Market size	13.3	13.8	22.7
Totals, materials handling equipment			
Production	89.1	107.3	129.1
Imports	43.6	51.2	66.9
Exports	8.5	16.3	14.7
Market size	124.2	142.2	181.3

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[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values based on Spanish trade source data. Foreign trade values based on statistics reported by the Spanish General Directorate of Customs, Ministry of Commerce.

Table 2.—Exports of mechanical handling equipment to Spain by principal suppliers, 1969-71[1]
(in millions of U.S. dollars)

	1969		1970		1971	
	Market Share		Market Share		Market Share	
	value	percent	value	percent	value	percent
United States	9.2	28.2	7.4	16.7	5.8	15.1
Germany	7.0	21.5	14.7	33.1	14.2	37.0
France	4.6	14.1	6.0	13.5	5.9	15.4
Sweden	3.4	10.4	3.2	7.2	3.5	9.1
Italy	3.2	9.8	3.5	7.9	3.0	7.8
Others	5.2	16.0	9.6	21.6	6.0	15.6
Total	32.6	100.0	44.4	100.0	38.4	100.0

[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by OECD, based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

in the sale of industrial vehicles to Spain, particularly high-capacity work trucks and vehicles with specialized features. Rack-stackers for high-bay warehouses, forklift trucks for use in container handling, and narrow-aisle and side-loading powered trucks will offer sales opportunities for U.S. manufacturers during the 1973-77 period.

The Spanish market for advanced handling systems is growing slowly. However, sales of systems incorporating electronic control instrumentation and computer technology are expected to become increasingly significant during the next few years, as are sales of package and container coding/decoding equipment.

End-User Analysis

Five sectors of Spain's economy—transportation equipment, food manufacturing and processing, iron and steel, railroads, and airlines—dominate the country's present and potential use of materials handling equipment and systems. These are sectors in which the Spanish Government is committed to promote the expansion of production, the fuller utilization of existing capacity, and the lowering of production costs.

The government's ultimate goals are to reduce Spain's dependence on imports, particularly imports of iron, steel, and motor vehicles; to stimulate the development of export-oriented industries; and to eliminate bottlenecks in the distribution of goods both within Spain and between Spain and her trading partners.

Transportation equipment.—In terms of growth potential, the transportation equipment industry constitutes the most dynamic market for materials handling equipment and systems in Spain. Transportation equipment accounted for $1.4 billion, or 11.3% of Spain's 1972 industrial production (excluding the construction sector).

Approximately 26,200 individual establishments, employing a total of 257,600 workers, were involved in transportation equipment manufacturing in 1969; 51 of these establishments each had more than 500 employees.

The industry's capacity to produce private motor vehicles, including pickup and panel trucks, is estimated at 700,000 per year and should rise to 1.1 million by 1980. Export sales of 170,000 vehicles are anticipated in 1980.

The Sociedad Espanola de Automoviles de Turismo, S.A. (SEAT), Spain's leading automobile producer and an associate of FIAT of Italy, plans to increase its production capacity substantially. Important investments in plant expansion also are planned by the British Leyland Motor Co. (through its Spanish associate Automoviles de Turismo Hispana Ingleses, S.A.—AUTHI), by Renault-Citroen, by the Ford Motor Co., and possibly by General Motors. Ford's Spanish assembly plant is expected to cost $250 million.

More than half the automobiles manufactured in Spain in 1972 were SEAT products. The firm has a total employment of over 26,000; its production facilities occupy 370 acres in Barcelona's Free Zone. These facilities are to be expanded and an additional factory is to be built on a 740-acre site at Martorell. The new facilities will require an investment of $85 million and will employ more than 5,700 additional workers.

SEAT's primary uses of materials handling equipment and systems at its Barcelona plant are for receiving and warehousing components and conveying materials along the assembly line. Six bridge cranes with 79-foot spans, capacities of 11 to 16.5 tons, and hooks for attaching chain or cable slings are used to store raw materials. Three 16.5-ton bridge cranes are used for storing plates and coils. Pneumatic pulley tackles capable of handling loads of up to 440 pounds are used in the paint warehouses, while tackles of from ¾ ton to 2.2 tons in capacity are used for handling containers of lightweight materials.

Fifteen staple cranes are used in stocking materials for final assembly. This type of crane was chosen by SEAT as an intermediate step toward complete mechanization of the warehouse. The firm's Martorell plant, which will centralize the manufacturing, testing, and inventory of spare parts, will have a completely computerized warehouse.

SEAT uses chain conveyors up to 5,000-feet long to move auto chassis, bodies, engines, and transmissions along the assembly line. Other continuous conveyors of up to 656 feet in length feed groups of machines.

More than 200 powered forklift trucks are in use at the SEAT plant. Electrically powered forklifts are used in the warehouse to move loads weighing up to 1,764 pounds. Electric or diesel trucks with a maximum lifting range of 11½ feet and capacities of 2.2 to 4.4 tons are used for heavier loads, while containers, coils, and machinery are moved by diesel trucks of 11- to 16.5-ton capacity.

SEAT's link with Italy's FIAT has been an important factor enabling Pianelli-Traversa, Italcarretillas, and other Italian MHE&S manufacturers to gain entry into the Spanish market. SEAT's facilities, which are visited daily by representatives of component suppliers and other firms, serve as a showcase for materials handling equipment and systems. The experience of the British Leyland Company also indicates that MHE&S manufacturers from the country of a parent company should experience a general increase in sales from the use of their equipment in local plants.

Food manufacturing and processing.—The food manufacturing and processing industry contributed $1.3 billion to Spain's 1972 gross national product and ranks second among the country's industrial sectors. Some 55,300 establishments were involved in the manufacturing and processing of food and kindred products in 1969, the last year for which data is available. Although these firms had a total work force of 292,000, only 34 of the firms had more than 500 employees.

Sociedad Nestle, Anonima Espanola de Productos Alimenticios, in Barcelona, is one of Spain's oldest and largest food processing firms and is an important user of materials handling equipment and systems. Nestle manufactures a variety of canned and powdered milk products, infant formulas, instant coffee, candies, and other foods.

Nestle's expenditures for MHE&S, which totaled $299,000 in 1972, are forecast to reach $310,000 in 1974. The company is considering full automation of its production processes if labor costs continue to rise. In the more immediate future, Nestle plans to acquire lifting machines, self-powered pallet trucks, conveyors, and static and dynamic shelving systems.

Nestle's 13 factories and 11 distribution centers now utilize 42,000 pallets, 51 lifting machines, 36 electric pallet trucks, 114 hand-powered pallet trucks, 7 conveyor systems, and 3 trailers. One of the more elaborate facilities of the Barcelona distribution center includes an automatic pallet lifter with a 60-pallet capacity.

Iron and steel.—Expansion of the iron and steel industry has been a principal goal in each of the Spanish Government's three successive Economic Development Plans. Steel production totaled almost 10.9 million tons in 1972 but fell 402,000 tons short of meeting domestic needs. The deficiency between production and consumption is expected to become more acute, even if output reaches the maximum of 12.2 million tons forecast for 1975.

To ensure that Spain's future steel requirements can be met, a new 6.6-million-ton Fourth Mill at Sagunto (Valencia) will be built by Altos Hornos de Vizcaya, S.A. (AHV) at a cost of $1.7 billion. This mill will be operated by AHV's subsidiary, Altos Hornos del Mediterraneo.

While encouraging the development of additional capacity, the Government of Spain is also promoting the modernization and integration of the country's 238 iron and steel mills, which in 1969 employed 79,200 workers. Only 28 of these firms employed more than 500 people and only 6 reported sales in excess of $230 million in 1968, the latest year for which information is available.

The largest private Spanish producer of iron and steel is AHV, in which U.S. Steel has a 25% interest. AHV, which reported 1972 sales of more than $360 million, doubled its output of steel from approximately 1 million tons in 1967 to over 2 million tons in 1972.

AHV plans to enlarge its factory at Echeverri, make substantial improvements in other factories, develop port facilities at Santurce to serve 88,000-ton ships, and invest $34.5 million in a sintering plant. Included on the list of AHV's near-term materials handling equipment needs are 10 special bridge cranes of various types, a wheeled bucket loader with a 164-foot span to handle stockpile fines, 4 wheeled or track shovels (of about 170 hp) for loading, and 10 forklift trucks.

Other MHE&S needs of the firm that could well be satisfied by U.S. manufacturers include stripper cranes, gantry cranes, self-propelled cranes of more than 110-ton capacity, forklifts of more than 16.5-ton capacity, high-capacity loading shovels, conveyors for handling high-temperature materials, skips, and high-capacity scrapers.

American suppliers also should find substantial sales opportunities at the Fourth Mill of Altos Hornos del Mediterraneo. In addition to its production facilities, the new mill will have a port capable of loading and unloading giant bulk ore carriers of up to 275,000 tons each.

Railroads.—All of Spain's standard-gauge railroads are owned and operated by Red Nacional de Ferrocarriles Españoles (RENFE), the country's largest state-owned corporation. RENFE's network, of which Madrid is the hub, comprises more than 8,000 miles of track.

The growing popularity of truck shipments in Spain has resulted in gross underutilization of RENFE's network. To counteract this situation RENFE has embarked on an ambitious program of freight containerization. The first container service was inaugurated on the Madrid-Barcelona line in 1972. RENFE plans to increase its stock of containers from the 600 it had in 1972 to 4,000 by 1976. Twelve express container trains are expected to be in operation by 1976, moving some 2.2 million tons of goods per year over a network connecting 11 specially equipped stations.

The containerization program has required substantial purchases of materials handling equipment. RENFE already has invested more than $4.5 million in cranes alone. Six of these are gantry cranes with a span of 55 feet between rails, a range of 820 feet, and a lifting capacity of over 33 tons. These cranes will be replaced eventually by larger ones. Other plans call for the purchase of 130 container platforms.

RENFE's capital investment plans go beyond the containerization program and will include a general modernization of facilities along the 3,000-mile "basic network" which links the capital city of Madrid with the principal coastal cities. It was in this connection that RENFE purchased two mobile cranes of 25-ton capacity from the Grove Manufacturing Co. (U.S.). Despite policies that require the railroad to purchase goods from domestic manufacturers whenever possible, RENFE may buy more U.S.-origin cranes.

RENFE's containerization and modernization programs are having the secondary effect of stimulating the use of materials handling equipment and systems at seaports and airports. As an example, Marítima Layetana, the concessionnaire for the cargo handling facilities at Barcelona's new container port, is an important prospect for American-made materials handling equipment.

Airlines.—The recent rapid growth in Spain's domestic and international air traffic has prompted the government, through the autonomous Aeropuertos Nacionales agency, to substantially increase its investments in airport improvement projects.

Spain's Third Economic Development Plan, which covers the 1972-75 period, calls for expenditures of $320 million for the expansion and reequipping of existing air terminals and the establishment of new ones.

Passenger facilities will consist mainly of finger-type installations. New freight terminals will require materials handling equipment and systems for the containerization, decontainerization, palletizing, handling, and classification of air freight. Over $11 million already has been budgeted for the purchase of conveying equipment and a variety of industrial vehicles.

The Barajas airport in Madrid is the only Spanish airport equipped to handle air freight expeditiously. The Barajas cargo terminal, built in 1970, uses materials handling equipment valued initially at $2 million to move nearly 100,000 tons of freight annually. Current equipment includes a roller-type conveyor system, a palletizing system, and a stacker/reclaimer system.

Because the terminal was designed for individually packaged cargo shipments, it is already considered outmoded. Improvements are expected to be incorporated gradually; the goal is to achieve complete automation of the terminal by 1980.

The new Barcelona air cargo terminal is being readied for opening in late 1974. This terminal, which will occupy an area of 7.4 acres, is designed to handle 385,000 tons of freight a year. Loading or unloading of jumbo aircraft is to be affected in 30 minutes.

In addition to the usual equipment for handling miscellaneous freight shipments, the Barcelona cargo terminal will include palletizing/depalletizing facilities; docks designed for lateral and frontal loading of aircraft and equipped with lifting and approximation apparatus; and stackers, transfers, and roller conveyors. The classifying conveyor will be controlled by a directly synchronized electromechanical unit.

Competitive Environment

Approximately 65 firms produce materials handling equipment in Spain. Their output is estimated to have totaled $129 million in 1972, up sharply from the $89 million produced in 1970.

Taking into consideration the increase in capital goods production forecast by the Spanish Government in its Third Economic Development Plan (1972-75), as well as recent trends in production and demand for materials handling equipment and systems, trade sources predict an average annual growth of 15% in domestic production of materials handling equipment during the period 1972-77. This growth rate takes into account a probable price inflation of from 3 to 5% per year.

Spanish production of materials handling equipment could, therefore, reach $265 million in 1977. Exports of such equipment may rise nearly as fast, climbing from an estimated $15 million in 1972 to a projected $27 million in 1977.

The majority of Spain's materials handling equipment manufacturers are small assemblers of equipment and depend heavily on foreign technical assistance and licensing agreements. The range of domestically produced equipment is broad, and companies often shift from one product to another as demand dictates. The consolidation of Spain's materials handling equipment manufacturers is handicapped by the prevalence of licensing arrangements and by the fact that many of the producers of parts, components, and accessories are owned by foreign firms.

Among Spain's manufacturers of lifting equipment, including cranes, are Bengo, S.A. (Aduna); Boetticher y Navarro, S.A. (Villaverde); Coll-Rodon, Suministros Industriales (Madrid); INME, Industrias Mecánicas (Bilbao); and Industrias Omega, S.A. (Bilbao).

A great number of firms, such as Alfaveg S.A. (Bilbao); J. de Miquel, S.A. (Barcelona); Poymetal, Manufacturas (Barcelona); Talleres E. Grasset, S.A. (Madrid); and Talleres Unidos, S.A. (Zaragoza) make conveyors and other materials handling equipment.

Spanish makers of industrial vehicles include Alfaro, Constructiones Mecánicas (Barcelona); Carretillas Serra (Valencia); Conor, S.A. (Bilbao); Eyher Construcciones (Andoain); and La Herramienta Industrial, S.A. (Leon).

The domestic industry receives substantial support and protection from the Spanish Government's "buy national" policy.

Article 10 of the 1939 Law to Regulate and Defend National Industry provides that governmental entities at all levels, state-owned monopolies, units of the national political organization, and all firms that receive official support of any type must generally limit their purchases to products manufactured in Spain. Exceptions to this rule may be granted only when the domestic production is nonexistent or unsatisfactory or in cases of particular urgency.

The impact of this policy is not restricted to the public sector; most private ventures receive some kind of State assistance and thus are subject to "buy national" provisions.

Spain's materials handling equipment industry also benefits from official policies that enable banks to grant favorable financing terms on the purchase of capital goods through a special line of credit established by the government to stimulate capital investment. Such financing is available for the purchase of imported capital goods if the imported equipment is of a type not manufactured in Spain.

Despite the advantages enjoyed by domestic producers, Spain's imports of materials handling equipment between 1972 and 1977 are expected to rise nearly as fast as total market size, ie., at an average rate of over 14% per year versus 15% for the market as a whole.

The need to combat inflation and improve the competitiveness of domestically manufactured goods, coupled with the relatively recent accumulation of substantial foreign exchange reserves, has led to a gradual liberalization of trade policy. Customs duties have been cut, and the list of foreign goods that may be imported only by the State has been shortened.

Of particular interest to U.S. manufacturers are the reductions of as much as 95% in duties levied on foreign-made components of domestically produced capital goods and the substantial temporary cuts in duties on complex, high-capacity materials handling equipment.

American MHE&S suppliers have responded vigorously to the sales opportunities afforded by Spain's dynamic economy. Some 80 U.S. companies are represented in the Spanish MHE&S market. They include such firms as Clark International, Diamond Chain Co., Ford Motor Co., General Motors Overseas, Grace Co., Jervis B. Webb Co., Link-Belt, Marine Travelift, Otis Elevator Co., Page Engineering Co., Rapistan, Inc., Toledo Scale, and Westinghouse Electric Corp.

Germany, which supplies one-third of Spain's MHE&S market and leads in sales of lifting, loading, and conveying equipment and accessories, is represented in Spain by more than 130 firms. These include the Siemens and Demag groups, Beck und Henkel, Fredenhagen KG, and H. Jungheinrich & Company Maschinenfabrik.

France, with approximately 70 firms represented in the Spanish market, is a leading supplier of monorails incorporating advanced instrumentation.

Several other countries, many of which specialize in supplying only one or two major product lines, compete in the Spanish market. For example, Sweden, with 14 MHE&S suppliers represented in the market, is an important source of winches, capstans, jacks, vibrator conveyors, noncable conveyors, and certain types of cranes. The Netherlands and Denmark successfully market overhead rail conveyors for the poultry industry. Norway is a leading seller of certain cranes, winches, and capstans.

Switzerland and Austria market aerial cable conveyors and funiculars, and Japan has recently emerged as a supplier of conveyors. Belgium and Bulgaria also are represented in the Spanish MHE&S import market.

Customs duties levied on materials handling equipment and systems imported into Spain range from 1% for machinery used in remote-controlled handling of radioactive materials to 40% for in-

Table 3.—U.S. exports to Spain of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	—	1,100	49	—
Parts for above	154	157	11	121
Other cranes, unmounted	405	353	463	1,752
Other crane parts	47	47	442	1,362
Subtotal, cranes and parts	606	1,65	965	3,235
Hoists	15	71	15	—
Parts for hoists	7	8	73	29
Derricks	—	—	—	—
Winches	172	347	311	73
Parts for above, etc.	611	183	161	394
Hydraulic jacks, parts	3	23	6	15
Other jacks and parts	2	3	1	—
Other lifting equipment	89	189	274	294
Subtotal, lifting equipment	889	824	791	805
Elevators, escalators	9	13	74	—
Parts for above	27	10	4	—
Gravity conveyors	—	—	—	—
Overhead conveyors	—	—	—	—
Pneumatic conveyors	5	—	167	—
Wheeled conveyors	—	—	—	—
Other conveyors	87	36	95	68
Parts for conveyors	62	361	294	42
Subtotal, conveyors and parts	140	420	634	110
Used and rebuilt tractor shovel loaders (TSL)	—	—	—	—
Front-end loaders for mounting on TSL	10	95	24	—
Subtotal, loaders and used TSL	10	95	24	—
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	63	436	98	635
4-wheel drive, -1	—	11	—	—
4-wheel drive, 1-1.49	—	127	—	—
4-wheel drive, 1.5-1.99	973	1,055	615	293
4-wheel drive, 2-2.49	311	25	41	16
4-wheel drive, 2.5-3.49	747	151	156	347
4-wheel drive, over 3.5	2,594	1,128	2,052	2,356
Subtotal, wheeled TSL	4,688	2,933	2,962	3,647
Total, lifting, loading, and conveying equipment	6,393	5.929	5,376	7,797
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng.	8	8	2	—
45-59.9 eng.	—	260	15	280
60-89.9 eng.	58	17	81	71
Over 89.9 eng.	383	534	121	799
Subtotal, tracklaying TSL	—	—	—	—
Underground loaders	74	54	116	100
Parts for above	523	873	335	1,250
Oil fld. rod-lift equipment	6,916	6,802	5,711	9,047
Oil fld. derrick, pts.	—	—	—	—
Other oil fld. lift equipment	106	—	11	—
Farm elevators	241	32	14	170
Parts for farm elevators	1,572	455	320	2,321
Automobile lifts	1,919	487	345	2,491
Underground mine conveyors	2	17	—	—
Subtotal, other equipment	2	3	1	16
Total, tracklaying and other equipment	—	—	—	—
Grand total, mechanical handling equipment	25	—	—	132

Table 3.—U.S. exports to Spain of materials handling equipment, 1969-72—Continued
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Industrial vehicles (IV)				
Walking and powered IV	9	1	—	16
Electric-powered IV	—	—	—	—
Gasoline-powered IV	—	—	—	—
Other-powered IV	—	4	—	—
Portable stackers	—	2	—	—
Parts for above	38	27	1	164
Total, industrial vehicles	1,957	514	346	2,655
Total, materials handling equipment	8,873	7,316	6,057	11,702

Source: *Exports, Commodity by Country*, FT-410—1969, 1970, 1971, and 1972, U.S. Department of Commerce, Bureau of the Census.

dustrial vehicle parts. Most tariffs fall between 17 and 25%.

Members of the European Economic Community, of which Spain is an associate, receive a 10% discount on the general rate. This discount is to be gradually increased to 25% by January 1, 1977.

The procedure for establishing the dutiable value of imported goods is complex and takes into consideration commercial relationships between the exporter and the importer. The duty on leased equipment is based on the purchase price of the equipment or on the sum of the rents payable during the probable lifetime of the goods. Modest fees incident to customs clearance also are charged.

Materials handling equipment and systems manufactured abroad are subject to a tax of 10 to 13%, which compensates for the value-added tax and other internal taxes levied on domestically produced goods. Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-228), U.S. Department of Commerce, Washington, D.C. 20230.

Leased equipment now represents less than 5% of total annual MHE&S sales, although the practice of leasing is rapidly gaining favor among Spanish MHE&S users, largely because of support from banks. Leasing agreements commonly cover a period of 3 to 5 years.

Since there is very little demand for used equipment, the lessor usually amortizes virtually the entire value of the equipment over the period of the initial lease contract. The finance charges amount to slightly more than 1% per month on the unpaid balance.

Only the more versatile types of equipment, such as forklifts and cranes, are available for short-term rental.

The largest MHE&S end-users employ their own maintenance and technical personnel. Many of these employees were trained at the MHE&S supplier's factory. Medium-size and small user firms must depend on the service capabilities of the equipment distributor, and the quality of this service often determines a buyer's choice of supplier.

Technical Requirements

The characteristics of Spain's electric power supply are 220/380 volts, 50 hertz, 3-phase. Spain uses the metric system of weights and measures. Users emphasize the desirability of U.S. manufacturers' presenting their product information in metric terms.

Technical standards governing materials handling equipment and systems to be offered for sale or lease in Spain have been developed by the Una Norma Española (UNE) and published by the Instituto de Racionalización del Trabajo. The Ministry of Industry normally accepts the suggestions of interested parties on items for which standards have not yet been formulated. Equipment and systems that meet U.S. standards generally are acceptable for use in Spain.

Detailed information on technical requirements may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

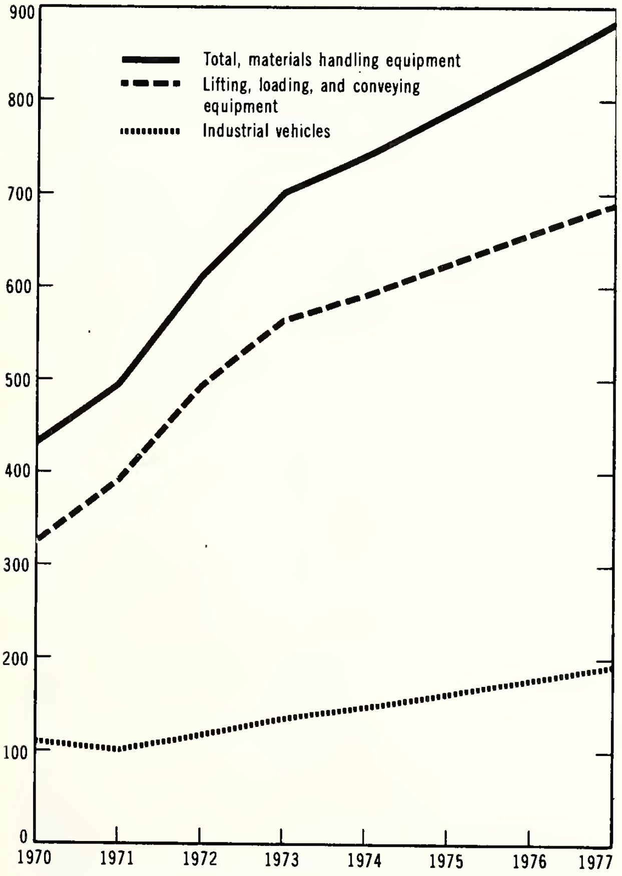
"The Market for Materials Handling Equipment and Systems in Spain," DIB 73-12-503, March 1973.

United Kingdom

The United Kingdom offers a strong, stable market for materials handling equipment and systems (MHE&S). British industry has placed a greater emphasis on the efficient movement of goods since the country's entry into the European Economic Community (EEC), and this has resulted in increased demand for materials handling equipment.

United Kingdom: Materials handling equipment market, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by U.S. Department of Commerce, Office of International Marketing, official British statistics, and trade estimates.

Widespread labor problems and chronic shortages of industrial land have contributed to the growing demand for advanced materials handling systems. Investments in MHE&S in the United Kingdom grew at more than twice the rate of capital expenditures during the 1968-72 period.

A significant increase in spending for materials handling equipment and systems by Britain's public and private industrial sectors should boost the country's materials handling equipment market to $882 million in 1977. The projected 1977 market represents an increase of almost 35% over the estimated $611 million market of 1972 and a rise of almost 70% over the $493 million market of 1971 (see table 1).

The anticipated increases in expenditures for lifting, loading, and conveying equipment and for industrial vehicles are a strong reflection of the growing trend in the United Kingdom toward greater mechanization of handling processes. Purchases of lifting, loading, and conveying equipment, which climbed from $391.8 million in 1971 to $492.5 million in 1972, should increase at an average annual rate of 7%, reaching $690 million in 1977.

Industrial vehicle purchases increased from $101.3 million in 1971 to $118.8 million in 1972. The expected average annual growth of 10.2% in the market for such vehicles between 1972 and 1977 should put the market at more than $192 million in 1977.

British imports of materials handling equipment rose from $60.7 million in 1970 to $107.5 million in 1972. An anticipated average annual growth rate of 17.2% should bring the import market to a level of $237.5 million by 1977. Imports of lifting, loading, and conveying equipment, which increased almost 90% between 1970 and 1972—going from $49.6 million to $93.7 million—are expected to climb over 118% between 1972 and 1977. They are projected to total $205 million in the latter year.

Britain's import market for industrial vehicles, valued at $11.1 million in 1970, had increased 24% by the end of 1972, reaching $13.8 million. The projected $32.5-million import market for industrial vehicles in 1977 reflects an increase of 135% over the 1972 level.

The United States exported mechanical handling equipment valued at $20.4 million to the United Kingdom in 1971, representing a 23.1% share of the total import market (see table 2). Germany ranked as the second most important foreign supplier in 1971, holding 20.8% ($18.3 million) of the market. Other important suppliers in that year were Sweden, with 15.9% of the market ($14 million); France, with 8.3% (7.3 million); and Norway, with 5.1% ($4.5 million).

Specific Sales Opportunities

Favorable sales opportunities for American manufacturers of the following products are indicated by a market research study recently conducted in the United Kingdom for the U.S. Department of Commerce.

Lifting, Loading, and Conveying Equipment

- Conveyors of all types
- Heavy cranes
- Tower cranes
- Stacker cranes
- Container cranes
- Vacuum attachments for cranes
- Reel clamps

Industrial Vehicles

- Parts for mechanically propelled work trucks and tractors
- Electronically controlled vehicles
- Battery-operated vehicles

Systems and Specialized Equipment

- High-bay, fully automated warehouses
- Semiautomated warehouses
- Wheeled containers
- Stacking equipment for containers
- Electronic controls
- Timing and counting devices
- Ultrasonic and photocell detection equipment
- Specialized postal machinery (automatic facing machines, coding desks, parcel-sorting machines)
- Palletizing and depalletizing systems
- Automated systems and equipment for loading bulk freight into railroad cars

Lifting, loading, and conveying equipment.— About 20% of the United Kingdom's lifting, loading, and conveying equipment was imported in 1972. Because domestic manufacturers cannot satisfy the growing demand generated by industrial modernization, this proportion is expected to increase to almost 30% by 1977.

U.S. suppliers will find a promising market for many types of conveyors, including flat belt, roller, and chain conveyors. The railroads and airlines are seeking ways to mechanize their passenger services and are expected to purchase baggage-handling conveyors during the next 5 years.

The United States will continue to provide the United Kingdom with heavy cranes, used in offshore oil and gas fields, and tower cranes, for which there is steady, long-term demand. American firms hold a clear, competitive lead in the import market for stacker and container cranes.

Table 1.—United Kingdom: Size of market for materials handling equipment[1] *1970-72*

(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	363.3	427.4	483.8
Imports	49.6	66.8	93.7
Exports	88.5	102.4	85.0
Market size[2]	324.4	391.8	492.5
Industrial vehicles			
Production	150.7	150.7	167.5
Imports	11.1	10.0	13.8
Exports	52.4	59.4	62.5
Market size	109.4	101.3	118.8
Totals, materials handling equipment			
Production	514.0	578.1	651.3
Imports	60.7	76.8	107.5
Exports	140.9	161.8	147.5
Market size	433.8	493.1	611.3

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[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values based on data from *Business Monitor*, published by the United Kingdom Department of Trade and Industry. Foreign trade values based on data from *Customs and Excise*, Annual Statement of Overseas Trade of the United Kingdom.

Table 2.—Exports of mechanical handling equipment[1] *to the United Kingdom by principal suppliers, 1969-71*
(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	21.2	33.9	25.9	31.0	20.4	23.1
Germany	12.1	19.3	14.8	17.7	18.3	20.8
Sweden	7.7	12.3	9.6	11.5	14.0	15.9
France	4.0	6.4	5.5	6.6	7.3	8.3
Norway	4.1	6.5	9.2	11.0	4.5	5.1
Others	13.5	21.6	18.6	22.2	23.6	26.8
Total	62.6	100.0	83.6	100.0	88.1	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for mechanical handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Country Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities,* Series C, Volume 111, 1969, 1970, and 1971, published by the Organization for Economic Cooperation and Development (OECD), based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

The market for crane attachments is improving as users discover more diversified applications. For example, packaging plants now use reel clamps and vacuum attachments that do not damage their wrapping materials.

Although the British are net exporters of lifting, loading, and conveying equipment, U.S. products are technologically more advanced than those manufactured in the United Kingdom, and American suppliers should continue to find good sales opportunities for new and unique equipment.

Industrial vehicles.—The United Kingdom offers a growing market for electronically controlled vehicles for use in automated or semiautomated warehouses. These vehicles also can be used in conjunction with a computer that controls the movement of goods from the production line to the storage area.

To meet British hygiene standards, the food industry will need to purchase battery-operated vehicles for use in processing plants. American-made parts for work trucks and tractors are imported for incorporation into vehicles manufactured in the United Kingdom. British purchases of U.S.-made parts amounted to $5.6 million in 1972.

Systems and specialized equipment.—Great Britain's entry into the EEC has led to an increase in the volume of goods being moved; and this has created bottlenecks in the United Kingdom's transportation and distribution systems. British firms are now considering the use of automated equipment to solve some of these problems. Fully automated high-bay warehouses are being built by storage companies and groups of manufacturers for use as distribution centers. Smaller businesses are turning to semiautomated, 30-foot installations to increase efficiency.

U.S. exporters will find an excellent market in the United Kingdom for many kinds of electronic controls. Several industries are looking for more sophisticated timing and counting devices, particularly counting meters and speed switches, and British firms have shown interest in ultrasonic and photocell detection devices. The Post Office, which is undergoing extensive modernization, will be purchasing large numbers of specialized postal machines.

British industry is rapidly adopting containerization, creating a sizable market for a variety of containers and handling equipment. Growing volumes of freight have led to the widespread use of pallets, opening up a substantial market for palletizing and depalletizing systems. Bulk freight handling is also becoming automated, and equipment and systems are needed for loading and unloading railroad shipments.

End-User Analysis

Materials handling equipment and systems are used in most sectors of the British economy. Manufacturers have recently recognized that improved warehousing and distributing methods can lead to savings of as much as 20% in the cost of the product, and this has influenced many to modernize their operations. End-users are looking for the most technologically advanced systems available, provided they can be assured of reliable performance.

Several industries are acquiring materials handling equipment as a direct result of Britain's new trade relationships with the Common Market countries. An influx of lower-priced imported products is leading many British manufacturers to employ more efficient methods to improve their competitive position.

A sharp increase in the demand for goods that are produced more economically in the United Kingdom than in other EEC countries is causing many British firms to add to their production capacity. Four industries that have been directly affected by these changes in market demand include food processing, paper and paper products, rail transportation, and air transportation. The extensive, nationwide modernization plans of the postal service are also considered.

Food processing.—Food processors accounted for 16% of the gross output of British manufacturing industries in 1971, when sales of food products reached $19 billion, $2 billion more than the 1970 level. Future growth rates will vary considerably among food processors, with the greatest expansion predicted for margarine and convenience foods producers. The British food and beverage industry in general holds a strong competitive position among the Common Market countries and should benefit from the new economic alignment.

Capital investment in plant and machinery by the food processing industry increased at an average of 4.5% per year from 1959 to 1970 and reached $386 million in 1971. The number of persons employed in the industry declined from 732,000 in 1970 to 728,000 in 1971, indicating a growing trend toward the use of laborsaving devices. While the number of establishments declined from 7,100 in 1963 to 6,400 in 1968, output per manufacturer rose, increasing the need for efficient storage and handling of goods.

The food processing industry presents a consistently strong market for materials handling equipment. Production line components are replaced regularly to maintain the meticulous standards of cleanliness required of food handlers. Several firms in this sector plan to install new MHE&S systems during the next 5 years in order to increase plant efficiency.

Battery-operated forklift trucks of various types are used extensively in the food industry, and purchases of electronically-controlled driverless vehicles are increasing. Solid state systems are preferred for various conveying, weighing, and measuring operations because they ensure high-volume production lines with less risk of breakdown.

The increased automation of bread production in the United Kingdom will provide good sales opportunities for advanced equipment, and high-volume production will increase the demand for sophisticated timing equipment in many sections of the food processing industry. Purchases of bulk handling and unit handling equipment should remain at high levels through 1977.

Bradfords Bakeries, Ltd., part of Associated British Foods, Ltd., has 500 employees, excluding deliverymen. It produces 24 million loaves of bread per year and has annual sales of approximately $60 million. Bradfords has two fully automated production lines using electronic detectors, vibratory feeds, automatic prover systems, and traveling radiant ovens.

The most sophisticated element in the system is the photoelectric control of the molding process. The bread is sliced and wrapped automatically, and a computerized system determines the variety of products for each delivery truck. Bradfords is planning to install a third breadline using as much solid state control equipment as possible, such as electronic counting of baking tins from prover to oven.

Paper and paper products.—The paper and paper products industry accounted for 3% of the total value of production of British industry in 1971, when sales totaled $3.6 billion. This was an increase of $200 million over 1970 sales. Approximately 1,650 firms with an aggregate of 236,000 employees were operating in this sector in 1968. The paper and board converting industry, which produces various grades of specialized papers and boards and other high-value converted products, has been growing much more rapidly than the paper products industry as a whole. Capital investment in the paper and board converting industry amounted to $84 million in 1970, while expenditures on plant and machinery by the entire industry totaled $145 million.

Suppliers of MHE&S can expect to find many sales opportunities in the paper and paper products industry, which is in the process of modernizing its facilities. The market should remain good for forklift trucks with reel clamps, overhead electric traveling cranes, and hoists, and demand is growing for vacuum attachments on reel-lifting cranes and electronic controls.

Conveyor systems are used for a variety of purposes, ranging from feeding hydropulpers to paper sorting. In the converting industry, conveyors are used in the manufacture of fiberboard drums and other containers.

One of the largest companies in the paper converting industry is R.W.P. Flexible Packaging, Ltd., of Bristol, which produces made-to-order packaging materials for household detergents, confectioneries, and medical supplies. This firm employed 1,400 people and achieved gross sales of nearly $25 million in 1972.

The factory contains very little advanced materials handling equipment outside of the actual production process. Raw materials are usually delivered on reels, which are moved by either forklift or hand trucks and overhead electric cranes with vacuum attachments. Web materials are moved by a variety of means, including forklift trucks, powered or manual pallet trucks, sack trucks, or crabs, or are simply rolled by hand. Approximately 65% of the finished goods is dispatched on pallets.

The company is interested in increasing the efficiency of its operations, particularly by improving the layout of its factory. Any MHE&S modernization program undertaken must provide flexibility in the movement of reels without damage to materials.

Rail transportation.—The Department of the Environment, which is responsible for Mainline rail transportation within the United Kingdom, directs the operation of the British Railways Board (BRB) and the National Freight Corporation (NFC). Mainline revenues reached $1.5 billion in 1971, an increase of 8% over 1970 income, despite a miners' strike that reduced the tonnage of coal and iron shipped.

Fares from passenger travel over the 11,600-mile Mainline route totaled $791 million in 1971; freight revenues accounted for $473 million, or 32% of total income; parcels and Post Office mail added $158 million; and miscellaneous traffic provided an additional $29 million. Approximately half of the miscellaneous revenue came from goods shipped in containers through the NFC.

The total capital investment in the railroad operations of the BRB and the NFC in 1971 reached $3.8 billion. The BRB spent $1.6 million on materials handling equipment, including 7 roller chain conveyors, 9 overhead cranes, 18 mobile road vehicle cranes, 1 overhead container crane, 33 crane hoist blocks and winches, 38 forklift trucks, 15 platform trucks, 12 tow tractors, and 9 loaders and excavators. The NFC spent $244,000 in 1971 for side loaders. The BRB has planned capital investments of $1.5 billion over the 1971-75 period.

Mainline since 1966 has installed 60 container cranes, consisting of four basic types: Class 2 Portal Goliath, Class 3 Portal Goliath, Class 3 Cantilever Goliath, and Ship/Shore Transporter. Straddle cranes are being replaced by side loaders because of their greater flexibility. Multipurpose cranes also will be in demand.

The BRB is studying the feasibility of freight cars controlled and directed by an automatic track/train communication system. Palletizing and depalletizing equipment also will be used more extensively, now that freight cars have been developed to carry pallet loads.

The current policy of the British Railways Board is to minimize unprofitable traffic by concentrating on trainload movement of bulk commodities and high-capacity containers. In 1970, 60% of rail freight was shipped in trainloads; this is expected to increase to 80% by 1977.

This policy, and the consequent deterioration of yards and minor terminals, has led to the growth of privately owned depots that consolidate loads for rail shipment. Several industries have also established their own consolidation depots, and BRB has provided special sidings to handle such bulk materials as cement, chemicals, coal, fertilizers, oil, ore, and steel.

The mechanized private sidings and terminals require the use of specialized handling equipment in addition to conveyors. Freight car unloaders and combined wagon tippers and crushers offer good sales opportunities. Power-operated container spreaders are preferred to the manually-operated spreaders. About 70 power-operated and 40 manual spreaders are currently in use.

The need for materials handling equipment to carry passenger baggage is growing because of rising labor costs and the difficulty of recruiting reliable personnel. Interest has been expressed in mechanical aids that allow the passenger to retain personal control of his baggage at all times, such as conveyors that carry luggage alongside moving walkways and escalators. The new passenger terminal at Parkestone Quay, Harwich, jointly planned by the BRB Eastern and BRB Shipping and International Services Division, will install escalators and hand-baggage conveyors.

The National Freight Corporation now operates 17 Freightliners Limited terminals for shipping containers. All terminals use container cranes, most of them purchased prior to 1969. The Birmingham terminal, which opened in 1970, is typical of the larger Freightliners Limited establishments. This depot operates around the clock, handling 400-500 containers daily for consignment to British ports for overseas shipment; very little domestic traffic passes through the terminal.

Container movement through the Birmingham terminal is controlled from a central traffic office by instruction sheets given to the crane operators, who also maintain radio contact with the office. All containers are handled by two container cranes and one side loader, plus one mobile crane used during the daily 2-hour maintenance period.

Containers are moved directly from the railroad flatcar to the delivery vehicle or to the roadway where they are stacked by container cranes. A Lancer-Boss 30-ton SWL side-loader moves the containers from the road to a temporary storage area. Most of the containers are either 20 or 30 feet in length, but the use of 40-foot containers is expected to increase in the near future. Containers are either 8 feet or 8 feet 6 inches in height.

The terminal uses two ARROL 30-ton SWL Container Cranes of the 2-6-2 type, which span six rail tracks and overhang two road widths. They are fitted with British Railways-designed spreaders that can handle 10- to 40-foot containers designed for top and bottom lifting. A central rotating frame on the trolley is carried on a slewing ring that permits loads to be handled from trucks parked at angles to the tracks, providing more efficient use of the transporter and storage area. The cranes are electrically driven and controlled by thyristor equipment with preselection for automatic positioning over the six rail tracks.

Air transportation.—British airlines carried 586-000 tons of freight and 51,000 tons of mail in 1971, a recession year. In the first three quarters of 1972, air cargo increased an average of 25% over the same period in 1971 and is expected to expand still further as a result of British membership in the EEC. This means that existing materials handling facilities at cargo terminals will have to handle substantially more goods and, in view of the importance of reduced turnaround time, handle them more rapidly.

The United Kingdom air transportation industry has been plagued with unreliable materials handling equipment and systems, making it reluctant to use advanced technology to solve its cargo problems. This sector has a definite need for consulting engineers well versed in the practical integration of various types of freight handling machinery.

Any use of containerization in conjunction with the new, larger aircraft will lead to a demand for heavy-duty forklift trucks. Suppliers should find a good market for conveyor systems used for passenger-accompanied baggage. Various baggage handling systems have been tried, but mechanical and electrical failures have led many users to revert to less complex systems. Some British airports are considering moving passengers and their baggage to the aircraft on moving platform systems, eliminating virtually all risk of losing luggage.

The BEA/BOAC Cargo Terminal at London is the largest center of its kind in the United Kingdom, moving 2,800 to 3,200 tons of cargo per week. Six hundred persons are employed in its 75,000-square-foot open hangar space. In 1968, BEA built a highly sophisticated installation for combined storage and distribution of cargo. The basic plant layout was designed by BEA's Engineering Department, with the Bagshawe Conveyor Co., Ltd., of Dustable, Bedfordshire, as the main contractor.

The warehouse uses four Bagshawe "Escavayor" elevators and a Houchin (LPG) high-lift mobile crane for items weighing up to 11 tons. Consignment and load weight are determined and the data fed to a computer that controls the transfer of goods by electrically powered, chain-driven roller conveyors. Cargo is stored in an 1,800-cell system by four Munck KF stacker cranes with a service platform access rail.

The system also uses four sectional power roller palletizers, each with an integral weigher and a separate control console, built by Davies, Pritchard and Richmond, Ltd., and special forklift trucks. BEA has had a series of major difficulties with their system, caused by breakdowns in the computer, plant, motors, and circuits.

Postal service.—The Post Office has exclusive rights to carry letters in the United Kingdom, while parcel transport is shared with other firms. There were 1,700 Crown Post Offices included in a total of 24,370 postal stations in 1972, and postal service income during that year reached $1.3 billion.

The Post Office plans to spend $110 million during the 1973-78 period to complete its extensive national reorganization and modernization program. Parcel sorting will be concentrated at 30 centers and letter sorting at central stations. Highly sophisticated mechanical handling equipment will be used. Mail will be transported from the mechanized sorting offices by wheeled containers that can be loaded into freight containers. No satisfactory technique has been developed for filling the wheeled containers from chutes.

The Post Office is considering a modular integrated system using the basic parcel container to convey letters and packets in bulk, prepacked in trays or boxes designed to fit the module. The basic parcel container could become the standard unit for handling mail in the United Kingdom, eliminating the need for mail bags and chain conveyors.

The Post Office is expected to purchase many types of conveyors, ultrasonic and photocell detection equipment, counting meters, speed switches, and container handling equipment. Letter-sorting offices installed linked coding, segregating, and letter facing equipment during 1973, so that these operations can be performed automatically in sequence rather than in stages. Present plans also call for purchases of parcel-sorting machines with electronic controllers and low-angle flat-band conveyors.

The Post Office is seeking techniques to reduce the number of manual operations in its new system. Mechanical reading of typed codes has been successfully demonstrated in the laboratory, and a test machine is now under construction. Funds have been allocated for the development of improved translators for sorting machines so as to reduce the number of sorters.

Five sorting centers have been established at a cost of approximately $37 million. Over $18 million of this was designated for the purchase and installation of materials handling equipment, with approximately $3.6 million spent for sophisticated electrical equipment and the remaining $14.4 million used for conveyors and associated equipment.

The Post Office at Birmingham, a parcel- and letter-sorting center, is typical of the new stations. This office sorts 2 million items of mail daily, using six floors of its building for parcels and five floors for letters. Mail is brought from the British Rail's New Street Station through a sub-basement tunnel in wheeled containers towed by electric tractors.

Parcels are moved automatically via conveyors, Langton rising elevators, and Vertiflo elevators from the loading platform to the various sorting machines and on to their distribution vehicles. The sorting and distribution processes are controlled by ultrasonic devices, speed switches, discharge control units, parcel detector units, television monitor circuits, and central consoles. The 13 parcel-sorting machines are controlled from a common corestore memory system having a capability of 50 outlets per machine. Meters record the total number of parcels sorted and the average rate per minute.

Letters are conveyed by a similar method, but most of the sorting is still manual. Mail is automatically segregated, faced, and canceled, then moved to another area for manual primary sorting. The office plans to install coding and automatic letter-sorting machines within the next few years. Meter tables provide for manual separation of letters and packets contained in meter postings. Secondary sorting is also manual. The automatic distribution of letters and packets is controlled by photocell equipment, cam timers, uniselectors, and relays.

Other equipment used includes tray conveyors, letter trays, bag-opening devices, mail-loading cabinets, and machines for packet and letter sorting, stamp canceling, and facing. Both the letter- and parcel-sorting operations use electromagnetic actuators, alarm and signal systems, bleep communicators, chain and band conveyors, spiral chutes, and various trolleys and wheeled containers.

Competitive Environment

The United Kingdom has developed a strong MHE&S manufacturing industry capable of supplying domestic consumers as well as a sizable export market. Total production reached $651 million in 1972, with exports accounting for $147.5 million. Production is growing at an average annual rate of 7% and is expected to reach $915 million in 1977, while the annual growth rate for exports between 1972 and 1977 is forecast at 12.9%.

The largest manufacturers of cranes in the United Kingdom are subsidiaries of foreign firms such as Demag Material Handling, Ltd., a German company, and Clark Equipment, Ltd., of the United States. Container cranes are produced by Geoffrey E. Macpherson, Ltd., agents for the Toyo Umpanki Company of Japan, and Paceco-Vickers, Ltd., agents for Paceco Division of the Freuhauf Corporation of America. Several British firms, including Abacus Engineering Company, Ltd., and George W. King, Ltd., manufacture traveling cranes. Container cranes are supplied to the railroads by Clarke Chapman-John Thompson, Ltd., and Stothert and Pitt, Ltd.

Davies, Pritchard, and Richmond, Ltd., design, manufacture, and install a wide range of custom-built conveyors, storage systems, process plant equipment, and special-purpose materials handling equipment. The firm is recognized for its ability to provide comprehensive service.

Custom-built baggage handling conveyor systems are manufactured and distributed by GEC-Elliott Mechanical Handling, Ltd., Sovex Ltd., and Marshall Handling Equipment, Ltd. Douglas-Rownson, Ltd., supplies airports with gravity conveyors, baggage and cargo handling installations, and palletizers. Conveyors and similar handling systems are also produced in the United Kingdom by A. and C. Jenner, Ltd., and the VME Conveyor Company, Ltd. Marshall Handling Equipment, Ltd., provides baggage-handling conveyor systems and palletizing systems.

Some 70 firms were manufacturing forklift trucks in the United Kingdom in 1972. These included notably Lansing Bagnall, Ltd., Lancer Boss, Ltd., the Henley Forklift Company, Ltd., the Eaton Corporation of the United States, and Jungheinrich, Ltd., a German subsidiary.

Many types of MHE&S systems and specialized equipment are manufactured in the United Kingdom by British and foreign firms. Builders of automated and semiautomated warehousing systems include Dexion, Ltd., and AEG, Ltd., a subsidiary of AEG-Telefunken, Germany. Barlow Myers, Ltd., produces container handling equipment. EMI Electronics manufacturers computer-controlled Rototugs, electronic control equipment, and accessories. Photocell equipment is supplied by Londex, Ltd., and the Electronics Corporation of America.

Specialized equipment for the Post Office, such as various types of letter handling equipment, is produced by GEC-Elliot Precision Controls, Ltd. Automated systems for handling freight shipped by rail are being produced in the United Kingdom by such firms as Crone and Taylor, Ltd., and Stone Wallwork, Ltd., a Hewitt-Robins licensee.

The most important foreign competition comes from firms that have established manufacturing subsidiaries in the United Kingdom. The only exception to this is found in the area of very heavy equipment, such as giant cranes and heavy conveyor systems, both of which are generally imported. Germany provides strong competition in automated conveyor and warehousing systems, including stacker cranes.

The United Kingdom's entry into the EEC will lead to the elimination of duties on goods imported from the original six members of the community and the adjustment of tariffs on imports from nonmember countries to Common External Tariff (CET) levels. These taxes will be reduced incrementally between 1973 and 1977.

Current CET tariffs range from 5.5% on certain types of cranes to 9.5% on side-loaders for top-lifting freight containers. British import duties in 1972 ranged from 7.5% on self-propelled cranes to 22% for straddle carriers. The only other tax levied on imported goods in the United Kingdom is a value-added tax, currently 10%, applied to transactions of both domestic and imported goods. In-

Table 3.—U.S. exports to the United Kingdom of materials handling equipment, 1969-72

(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading and conveying equipment				
Overhead cranes, etc.	—	152	4	281
Parts for above	11	154	48	1,855
Other cranes, unmounted	478	426	717	11,800
Other crane parts	1,080	733	1,599	1,886
Subtotal, cranes and parts	1,539	1,465	2,368	15,822
Hoists	228	223	189	556
Parts for hoists	82	27	32	82
Derricks	—	—	—	13
Winches	463	314	191	584
Parts for above, etc.	5,616	6,726	4,764	5,190
Hydraulic jacks, parts	167	603	146	271
Other jacks and parts	594	175	109	209
Other lifting equipment	522	232	127	392
Subtotal, lifting equipment	7,672	8,300	5,558	7,297
Elevators, escalators	45	47	67	220
Parts for above	335	392	279	256
Gravity conveyors	98	6	39	—
Overhead conveyors	1	3	1	—
Pneumatic conveyors	12	35	3	—
Wheeled conveyors	32	8	1	—
Other conveyors	160	201	713	638
Parts for conveyors	330	593	640	527
Subtotal, conveyors and parts	1,033	1,285	1,743	1,641
Used and rebuilt tractor shovel loaders (TSL)	10	28	—	—
Front-end loaders for mounting on TSL	12	—	4	—
Subtotal, loaders and used TSL	22	28	4	—
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	—	10	—	—
4-wheel drive, -1	—	162	66	—
4-wheel drive, 1-1.49	—	10	10	—
4-wheel drive, 1.5-1.99	170	287	33	137
4-wheel drive, 2-2.49	—	—	—	42
4-wheel drive, 2.5-3.49	140	—	—	17
4-wheel drive, over 3.5	1,823	2,856	1,894	2,535
Subtotal, wheeled TSL	2,133	3,325	2,003	2,731
Total, lifting, loading, and conveying equipment	12,399	14,403	11,676	27,491
Industrial vehicles (IV)				
Walking and powered IV	66	166	191	222
Electric-powered IV	203	159	109	118
Gasoline-powered IV	158	1,103	312	280
Other-powered IV	348	987	244	132
Portable stackers	2	74	—	—
Parts for above	5,435	7,761	6,679	5,634
Total, industrial vehicles	6,212	10,250	7,535	6,386
Total, materials handling equipment	18,611	24,653	19,211	33,877
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 eng. H.P.	110	—	—	—
45-59.9 eng. H.P.	7	—	—	—
60-89.9 eng. H.P.	663	184	—	121
Over 89.9 eng. H.P.	1,055	423	1,026	1,230
Subtotal, tracklaying TSL	1,835	607	1,026	1,351
Underground loaders	3	134	—	153
Parts for above	42	60	—	180
Oil field rod-lift equipment	3	26	3	69
Oil field derrick, parts	385	1	23	19
Other oil field lift equipment	306	371	167	741
Farm elevators	—	—	—	—
Parts for farm elevators	—	1	—	—
Automobile lifts	13	7	5	—
Underground mine conveyors	—	—	—	—
Subtotal, other equipment	752	600	198	1,162
Total, tracklaying and other equipment	2,587	1,207	1,224	2,513
Grand total, mechanical handling equipment	21,198	25,860	20,435	36,390

Source: Exports, Commodity by Country, FT-410—1969, 1970, 1971, and 1972, U.S. Department of Commerce, Bureau of the Census.

formation on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-224), U.S. Department of Commerce, Washington, D.C. 20230.

The British importer of high-value and medium-value materials handling equipment is generally able to obtain financing at interest rates from 9.5 to 12.5%. Grace periods and penalty clauses vary. The usual payment schedules call for one-third on placing the contract, one-third on delivery, and most of the remaining one-third on satisfactory installation. Usually, 10% is withheld until performance has been adequately tested.

Warranties on high-value equipment and systems depend on the relationship between the supplier and the customer. Crane or conveyor system manufacturers normally give a 12-month guarantee to repair or replace any parts free of charge. Repairs after that time may be provided at reduced charges, i.e., labor only, depending on the importance of the customer. Internal combustion forklift trucks are usually covered for 12 months or 2,000 miles; electric truck warranties are good for 6 to 12 months.

Leased equipment is purchased by finance companies and rented to the user, who assumes full responsibility for maintenance. Lease agreements run up to 7 years, with a minimum period of 3 years. Extensive rental facilities for forklift trucks are offered by truck manufacturers and by rental companies. Lessees frequently buy service contracts to ensure fixed prices for routine maintenance and inspection, although some repair charges still have to be met by the user. Expenditures on leasing have increased an average of 30% a year since 1960, reaching approximately $40 million in 1973.

Great effort must be made by prospective suppliers of materials handling equipment to demonstrate the positive advantages and annual savings accruing from the use of their equipment. The British consumer is sophisticated and is becoming less conservative, so that design and novelty can also be strong selling points.

Technical Requirements

The United Kingdom has developed specific standards for most types of materials handling equipment and systems. Government organizations must adhere to the published standards, but private industries may determine their own requirements. U.S. standards generally are acceptable, provided that individual test requirements are not lower than those of the British. Specific information is available from the British Standards Institution, 101 Pentonville Road, London, N1 9 N.D. Information on technical standards is also available from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

British law requires that at the time of sale all imported goods must be clearly labeled with the country of origin. Goods may carry a Briitsh name or symbol, provided that the country of origin is clearly and conspicuously indicated. These regulations do not apply to secondhand merchandise.

The maximum safety workload must be clearly marked on lifting beams and pulley blocks. It is good practice, though not a legal requirement, to show maximum load per unit of area on racking and similar equipment. Safety requirements are covered in *Health and Safety at Work No. 43—Safety in Mechanical Handling,* which may be obtained from Her Majesty's Stationery Office.

Electrical power in Britain is supplied in 50 hertz AC, single- or 3-phase, 220/250 and 400/450 volts. The metric system of weights and measures has been in use since 1971 and will be fully implemented in 1975. Imperial Units may be used in the interim.

Official statistics of the U.S. Bureau of Census annual publication, *Exports, Commodity by Country,* FT-410, shows in detail on page 8 U.S. exports of materials handling equipment to the United Kingdom in selected years.

> The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:
>
> "The Market for Materials Handling Equipment and Systems in the United Kingdom," DIB 73-12-515, April 1973.

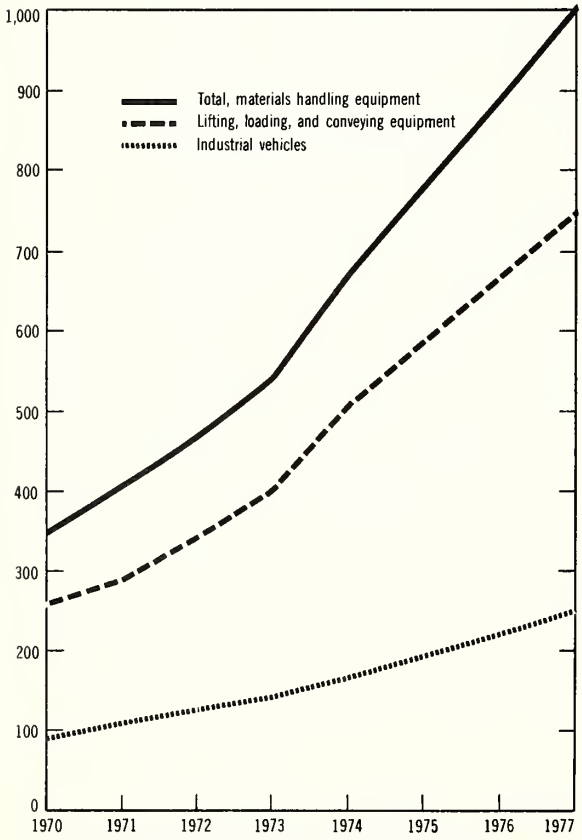
U.S.S.R.

The U.S.S.R.'s efforts to expand and modernize its industries generated an increase in materials handling equipment purchases from $352 million in 1970 to $469 million in 1972, representing an average annual growth rate of 15.5% (see table 1).

The even higher rate of 16.4% is projected for the 1972-77 period, with the market expected to reach $1 billion in the latter year. Underlying the projected increases of materials handling equipment and systems (MHE&S) purchases are the Soviet Union's plans to increase productivity in industry by introducing more modern equipment and technology.

U.S.S.R.: Materials handling equipment market 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by Office of International Marketing, U.S. Department of Commerce, official U.S.S.R. statistics, and trade estimates.

Approximately 73% of Soviet expenditures for materials handling equipment in 1972 was spent for lifting, loading, and conveying equipment. The market for this equipment grew from $261 million in 1970 to $344 million in 1972 and is expected to reach $749 million by 1977.

Purchases of industrial vehicles accounted for 27% of the Soviet materials handling equipment budget in 1972. Sales of such vehicles are expected to increase in 1977 to $252 million, more than double the 1972 level of $125 million.

The U.S.S.R. imported 95% of its materials handling equipment in 1972, primarily from Eastern European countries. Its heavy dependence on foreign suppliers should continue through 1977, by which time the import market is expected to reach $923 million.

The United States is the leading Western exporter of mechanical handling equipment to the U.S.S.R. American sales surged from less than $7 million in 1970 to $22 million in 1972 (see table 2). The United States held over 30% of the Western nations' share of Soviet imports of MHE&S in 1972. Based on an average annual growth rate of 17.9%, U.S. sales are expected to grow from $22 million in 1972 to $50 million by 1977.

The United States is expected to maintain its market share among Western nations during the

1973-1977 period, and may even better this position because of the recent devaluation of the U.S. dollar, improved export credit arrangements, and the reputation of U.S. firms for having the best equipment utilizing the most advanced technology.

The leading Western competitor of the United States in 1972 was West Germany, which supplied the Soviet Union with mechanical handling equipment equipment valued at $8.1 million, or 11% of the exports provided by Western nations. Other suppliers in 1972 included France, with exports of $7.1 million, or 9.7% of the import market, and Japan, Italy and Finland, with exports of $6.2 million, $6 million and $5.6 million, respectively. Western firms compete primarily in the sale of sophisticated lifting, loading, and conveying equipment to the Soviet Union.

COMECON countries are the U.S.S.R.'s principal source of materials handling equipment. Bulgaria, Hungary, East Germany, and Czechslovakia supplied almost 85% of Soviet imports of such equipment in 1972. The Eastern bloc furnishes traditional equipment, including industrial vehicles, but technologically advanced equipment generally is imported from Western suppliers.

Specific Sales Opportunities

The Soviet Union has been importing significant amounts of modern materials handling equipment since 1970 in an effort to increase the rate of its industrial growth, which fell from about 10% in the 1950's to almost 7% in the 1960's.

A market survey recently conducted for the U.S. Department of Commerce in the Soviet Union reveals favorable export possibilities for American manufacturers of the following products:

Lifting, Loading, and Conveying Equipment

- Conveyors, particularly belt and roller
- High payload and specialized cranes
- Dock cranes
- Derricks
- Advanced elevators
- Hydraulic loaders
- Vacuum lifting equipment
- Container handling equipment
- Hoists
- Portal reloaders
- Stackers

Systems and Specialized Equipment

- Computerized handling systems
- Storage and retrieval systems
- Vibrating feed equipment
- Bin-level indicator equipment

The U.S.S.R. imported almost 98% of its requirements for lifting, loading, and conveying equipment in 1972, and Western suppliers held 20% of this import market. Demand for stackers, elevators, and conveyors for the Soviet motor vehicle industry and automatic conveyors for its food processing industry should continue. Additional Soviet requirements through 1977 are seen to include large cranes, sophisticated stackers and elevators, and vacuum lifting equipment. American firms may receive substantial orders for these products.

A trend is developing in the U.S.S.R. toward the use of systems and specialized equipment. Computerized control systems and storage and retrieval systems are being introduced in two modern plants of the motor vehicle industry—Tol'yatti and Kama River. Such systems will also be needed in the fertilizer and food processing industries. Computer-

Table 1.—U.S.S.R.: Size of market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972 [1]
Lifting, loading, and conveying equipment			
Production	56.4	64.5	73.9
Imports	256.6	293.4	335.9
Exports	52.2	59.8	66.0
Market size [2]	260.8	298.1	343.8
Industrial vehicles			
Production	11.9	14.4	16.6
Imports	79.3	96.3	110.7
Exports	.5	1.3	2.0
Market size	90.7	109.4	125.3
Totals, materials handling equipment			
Production	68.3	78.9	90.5
Imports	335.9	389.7	446.6
Exports	52.7	61.1	68.0
Market size	351.5	407.5	469.1

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[1] Bureau of International Commerce estimates based on market research.

[2] Market size equals production plus imports minus exports.

Source: Production values based on official trade source estimates. Foreign trade values based on *Trade by Commodities*, Series C, Volume III, 1970 and 1971, published by the Organization for Economic Cooperation and Development (OECD); and Vneshniaia Torgovlia Nos. XVIII and XIX. 1970 and 1971.

Table 2.—Exports of mechanical handling equipment to the U.S.S.R. by principal suppliers, 1970-72 [1]
(in millions of U.S. dollars)

	1970		1971		1972 [2]	
	Market Share		Market Share		Market Share	
	value	percent	value	percent	value	percent
United States	6.9	15.1	18.2	31.1	22.0	30.1
West Germany	6.1	13.4	4.4	7.5	8.1	11.1
France	6.1	13.4	4.3	7.3	7.1	9.7
Japan	2.3	5.0	4.0	6.8	6.2	8.5
Italy	10.4	22.8	8.1	13.8	6.0	8.2
Finland	5.7	12.5	4.4	7.5	5.6	7.7
Other OECD	8.1	17.8	15.2	26.0	18.0	24.7
Total OECD area	45.6	100.0	58.6	100.0	73.0	100.0
COMECON [3] countries	290.3		351.1		373.6	
Total Imports	335.9		389.7		446.6	

[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Country Surveys comprising the Global MarketSurvey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

[2] Bureau of International Commerce estimates based on market research.

[3] The COMECON (Council for Mutual Economic Assistance) comprises Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, Romania, and the U.S.S.R.

Source: *Trade by Commodities*, Series C, Volume III, 1970 and 1971, published by the Organization for Economic Cooperation and Development (OECD), based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada and Japan. COMECON statistics based on Vneshniaia Torgovlia Nos. XVIII and XIX, 1970 and 1971.

ized systems to control container traffic also are likely to be introduced.

End-User Analysis

The U.S.S.R. had a population of 247 million in 1972, in which year the gross national product (GNP) totaled $580 billion and per capita consumption reached $2,343. The GNP grew 4% in 1971 and dropped back to 2% in 1972.

Growth of industrial productivity in the U.S.S.R. slowed from an average of 6.8% in the 1966-70 period to 6.2% in 1971 and 5% in 1972. This was well below the 7.4% a year anticipated in the ninth (1971-1975) Five Year Plan. The Plan relies on productivity increases and the rapid introduction of new technology to achieve the projected growth rate.

Water transportation, motor vehicles, lumber and wood products, fertilizers, and food are among the end-user industries expected to have significant requirements for materials handling equipment. Each of these industries is receiving special attention in the current Five Year Plan.

Water transportation.—The largest single consumer of new materials handling equipment during the 1973-1975 period in the U.S.S.R. probably will be the transportation industry, including the ocean, river, rail and truck transport sectors. In order to handle the anticipated increase in shipments, a total investment of $30 billion has been earmarked under the current Five Year Plan for the modernization of the Soviet transportation industry.

The Soviet Union's efforts to provide modern ports and efficient, rapid transportation of goods across its huge territorial expanse should lead to good sales opportunities for MHE&S suppliers.

The Soviet merchant marine has held 6th place in tonnage of world shipping since 1966, having moved up from 11th place in 1960. As a result of growing Soviet trade, the merchant marine has increased from 1,140 ships with a total of 3.4 million gross tons in 1960 to 6,850 ships with 16.7 million gross tons in 1972. The U.S.S.R. has on order 395 ships which will provide large, modern, specialized vessels to supplement general cargo carriers.

Soviet ports have been unable to properly service the merchant fleet because of labor and equipment shortages. However, the Ministry of Merchant Marine is now moving to improve port performance by (1) building additional deep-draft berths, (2) replacing general purpose cranes with specialized cargo handling equipment, and (3) introducing automated equipment. Construction of new ports such as Vrangelya and Vestochni and modernization of existing ones has begun and will continue through 1977.

According to Soviet projections, the volume of dry cargo handled in U.S.S.R. seaports should increase by 10% annually in the 1973-1975 period, reaching 168 million tons in the latter year.

River transport is indispensable in the U.S.S.R. because of the vastness of its territory and the poorly developed land transport system. Consequently, construction of river ports and the introduction of technologically advanced equipment are being accelerated during the 1973-1975 period.

A containerization drive is now in progress in the Soviet Union, and container cargo is expected to reach 60 million tons annually by 1975. The U.S.S.R. has only a few thousand large containers and only one fully containerized ocean-going vessel, although a significant number of large containers and 34 container ships are on order.

Specialized terminals for handling containers are to be built during the 1972-1975 period at the seaports of Leningrad, Riga, Iliichevak and Nakhodka, and a number of other ports are to be improved and equipped to handle containers. Experimental transportation of heavy containers by the Soviet river fleet from Moscow via Perm to Lensk and Yakutsk began in 1972. The Lensk River fleet currently is being reorganized to handle heavy containers.

The rail terminals at Brest, Chop, Ungenia, and Riga should be equipped for handling heavy containers, and about 100 cities are expected to build facilities which can handle up to 1,500 large containers per day.

Imports of materials handling equipment for the U.S.S.R.'s transportation industry reached $39 million in 1971 and $45 million in 1972, constituting 10% of the MHE&S import market. Representative of the suppliers is the Mitsui group of Japan, which is supplying loading and unloading equipment for the Vrangelya industrial port now under construction.

The Swedish firm Kone Oy is to supply two 30.5-ton dockside gantries and two 30-ton Goliath cranes for the Port of Leningrad. An East German firm is to supply 58 cranes to transfer 30-ton capacity containers from railroad platforms to sea and river vessels.

Cranes are needed in the transportation industry, and large orders are being placed with Japanese, Finnish, German, and other Western manufacturers. Good sales opportunities are believed to exist for U.S. manufacturers of powerful gantry cranes and portal reloaders with a lifting capacity of up to 50 tons.

Motor vehicle industry.—The motor vehicle industry grew by 50% during the 1971-72 period and anticipates annual production of 2.1 million vehicles by 1975. Total production of passenger cars in the U.S.S.R. reached only 201,000 in 1965, far below that of any other industrialized country. However, annual output of passenger cars is planned to grow during the 1971-1975 period at the exceptionally high rate of 30%, and is projected to reach 1.2 million units in 1975.

The planned expansion of the motor vehicle industry has involved the largest investment in Western technology ever made by the Soviet Union. About $700 million has been spent in the West since 1966 for equipment and technology for the Tol'yatti, Moscow, and Izehevsk plants. The Moscow passenger car plant was enlarged and the new Izehevsk passenger car plant was built by Renault of France. The Volga Motor Vehicle Plant at Tol'yatti is the largest and most modern passenger car plant in the Soviet Union. This plant was designed and built under a 1966 agreement with Fiat of Italy.

Output of trucks in the U.S.S.R. is planned to increase by about 46% from 1970 to 1975, going from 525,000 vehicles to 756,000 in that period. Modernization and expansion is planned for the facilities at Ul'yanovsk, manufacturing light trucks, and at the Gor'kiy and Moscow Likachev plants, producing medium trucks. These plants will use imported Western equipment, including overhead conveyor systems and computer control systems.

The Kama River complex, now under construction, is expected to be the world's largest truck manufacturing facility and one of the major purchasers of materials handling equipment in the Soviet Union. The initial investment is estimated at $1.75 billion and the plant should begin operation in 1974, reaching full capacity in 1975.

A significant portion of the U.S.S.R.'s imports of materials handling equipment for the complex is being supplied by U.S. firms indirectly, through other Western contractors. Renault of France has already been chosen for the $200-million diesel engine plant, and Liebherr Versahntechnik of West Germany has been awarded the gear engineering unit contract.

The Therme Electron Corp. (U.S.) has received an order to construct 22 heat-treating furnace lines. Another American firm, Gulf & Western Industries, has won a contract to supply a production line. The United Kingdom's Girling Ltd. has received a contract for a $3-million automated assembly line to manufacture vehicle brake shoes, and West Germany's Rheinstahl will supply production lines valued at more than $10 million for crankshafts and other engine and frame components.

Materials handling equipment manufacturers should also find many sales opportunities for systems and specialized equipment for use by the Soviet motor vehicle industry. Recently, Honeywell-Bull, the French affiliate of Honeywell, Inc., contracted to supply a $1.3-million automated stock control system for the Volga Motor Vehicle Plant. Mannesmann-Geisel GmbH. of West Germany was awarded an $8- million order for a conveyor system for the ZIL Truck Works in Moscow. This will consist of eight fully automatic, computer-controlled conveyors, to be installed in the parts warehouse of the plant.

Lumber and wood industry.—The lumber and wood industry, which employed about 2.8 million workers in 1970, is one of the largest industrial sectors of the Soviet Union. Although total production of timber in 1972 was estimated at 380 million cubic yards, the production of timber, pulp, and paper was generally insufficient to satisfy demand in that year. The U.S.S.R. wants, of course, to increase production of timber and wood products for both domestic consumption and export.

Soviet officials believe that modernization and expansion is needed in all phases of the lumber and wood industry, including rough mill work and the production and handling of wood products. The Soviet Union consequently is building huge modern plants which will have automatic and mechanized processes.

The current Five Year Plan allocates $1.6 billion to the lumber and wood industry to purchase capital equipment. New production facilities were added in 1971 and 1972 at the Solikamsk Paper and Pulp Combine, the Kayl-Orda Pulp and Cardboard Factory, and the Baikal Pulp Plant. New projects now scheduled include pulp plants at Arkhangelsk, Kotlas, and Bratsk; pulp and paper plants at the Syktyvkar complex; and hardboard, lumber, and sawmill facilities at Ust-Mlin.

The U.S.S.R.'s import market for MHE&S for the lumber and wood industry was $27 million in 1972. Japan and Finland are supplying materials handling equipment to the Soviet lumber and wood industry on a barter basis. Japan is accepting chip, pulpwood and timber in exchange for equipment, while Finland is receiving lumber and logs in payment.

Materials handling equipment and systems to be acquired in the 1971-75 period include hydraulic loaders, semi-automatic lines, and clamp-hook cranes with 30-, 50-, 60-, and 100-ton lift capacities. The U.S.S.R. has indicated a strong interest in large semiautomatic production lines with capacities of 50,000 and 100,000 cubic meters of splint board per year, as well as plants with a capacity of 20-25 million square meters for wood fiber board production. Extreme temperatures in Siberia require equipment capable of operating at temperatures well below freezing.

The problem of modernizing the lumber and wood products industry is compounded by the transportation difficulties arising from the enormous size of the Soviet Union and the remoteness of the Siberian forest areas from industrial centers. Heavy duty trains are to be introduced to increase timber haulage. The long distances lumber must be transported from Siberia to the western part of the U.S.S.R. and the increasing volume of wood products to be shipped will require additional purchases of lifting and loading equipment.

Fertilizer industry.—The current Five Year Plan allocates $28 billion for investment by the chemical industry (including the fertilizer sector) which is almost double the amount appropriated under the previous plan. Output in the fertilizer sector is expected to increase from the 1970 level of 55 million tons to 92 million tons in 1975.

The U.S.S.R. awards contracts for fertilizer plants to a primary contractor, who subcontracts for many types of equipment, including materials handling equipment. Contracts for turnkey chemical plants have gone in recent years to both East European and West European enterprises. East German firms were the major suppliers in 1972, although Japanese and French firms also received substantial contracts.

The fertilizer industry in 1972 imported MHE&S valued at $14 million, or 3% of the total market. Western European observers believe, however, this share may increase to 5% during the 1973-75 period. Plants are expected to increase imports of MHE&S from Western suppliers for packaging and handling fertilizers during the next few years. Soviet needs for conveyors are believed to be particularly urgent. Sales prospects for cranes, loaders, and other materials handling equipment are favorable.

Food processing industry.—The value of production in the food processing industry is planned to increase from $110 billion in 1972 to $134 billion in 1975. The current Five Year Plan allocates over $13 billion to the food processing industry in an attempt to improve the Soviet diet. All sectors of the industry, including fruits and vegetables, meat, dairy products, and seafood, are being modernized and enlarged.

The Soviets plan a 36% increase in production of the dairy industry during the current Five Year Plan. To help achieve this growth, the Soviet Union will expand and modernize existing facilities and build new dairy plants. New plants brought into service will include 128 for processing milk, 72 for producing whole and non-fat dried milk, 28 to make artificial milk for livestock, and 6 to manufacture canned milk. The dairy sector is expected to import conveyor lines for use in the new plants.

Approximately 5,000 production lines and 2,000 food processing plants were automated in 1971. The trend toward automation is expected to continue, and Soviet industry is unable to produce enough modern materials handling equipment to satisfy the demand. U.S. manufacturers will compete with suppliers from other countries, particularly West Germany, Japan, and Sweden, to fill the gap.

The U.S.S.R. imported materials handling equipment and systems valued at $18 million in 1972. The Swedish firm, Alfa Laval, obtained orders in 1973 to supply, over the next decade, 17 meat packing plants, 25 fat refiners, 10 hard cheese production lines, 5 continuous lines to produce curds, and 5 plants for producing and canning condensed milk. Alfa Laval will also supply a dairy at Chertanovo, near Moscow, with an automated warehouse system.

Competitive Environment

The U.S.S.R. has 70 major plants producing materials handling equipment. While two-thirds of these plants produce a wide variety of cranes or conveyors, a few are scheduled to manufacture larger and more advanced equipment under the current Five Year Plan.

The Bureiski Mechanical Plant in 1971 started production of 6-ton electric gantry cranes for handling containers, and is currently expanding to make other types of cranes with greater load capacities. The Uslovski Engineering Plant is scheduled to manufacture heavy gantry cranes with load capacities of 20-25 tons. Soviet materials handling equipment plants are likely, however, to supply only about 5% of Soviet needs for MHE&S in the 1973-75 period.

The East European countries of Bulgaria, Hungary, East Germany, and Czechslovakia will continue to dominate the U.S.S.R.'s import market for materials handling equipment over the next few years. Bulgaria should remain the Soviet Union's principal supplier of imported industrial vehicles. Although technology in Eastern European plants is improving, COMECON suppliers are not expected to compete with Western nations in sales of large and highly sophisticated equipment.

Among the U.S. suppliers of materials handling equipment to the U.S.S.R. are Bucyrus-Erie Co.; the Caterpillar Co., FMC Corp. (particularly through its Italian subsidiary), and Otis Elevator Co.

Finnish suppliers include Kone Oy, Jauma-Repola Oy, Suomen Autoleollisuus AB, and Enso-Gutzeit Oy. Among the German firms are Mafi Fahrzeugwerk GmbH; Klaus, Franz, Maschinen and Apparatebau; Jost-Werke GmbH; Contrans Gesellshaft fur Containerverkehr GmbH; Hamburger Hafen und Lagerhaus AG, and Lagerhaus und Transport GmbH. French firms include Fruehauf-France, Claude and Luchaire S.A., and Honeywell-Bull.

The import duty on all machinery and equipment ranges from 5 to 20%. The median duty charged on materials handling equipment imported from the United States is 7.5%. Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-552), U.S. Department of Commerce, Washington, D.C. 20230.

Foreign trade associations are responsible for all Soviet imports from other nations and foreign suppliers therefore cannot contact the end-user directly. American businessmen may receive contracts from the U.S.S.R. through two basic routes: directly from a Soviet foreign trade association, or from another Western firm which is the primary contractor on a major project. The supplier must obtain approval of his subcontractors from the appropriate Soviet foreign trade association.

Western manufacturers are increasingly active in soliciting business in the Soviet Union, some having resident representatives, others traveling there from the West. U.S. firms can most effectively introduce and promote new products in the Soviet Union at the U.S.S.R.'s semi-annual exhibitions. These exhibitions are visited mainly by professionals. U.S. manufacturers can meet the potential industrial end-users and the relevant foreign trade association officials at these events. State sponsorship in the U.S.S.R. of exhibitions intended solely for separate industries is infrequent.

The U.S.S.R. generally does not lease or rent materials handling equipment and systems. The Soviet Union normally wants firm delivery dates and strong product guarantees because fulfillment of broader economic plans in dependent upon prompt delivery and good performance of imported equipment. Extensive bargaining is frequently necessary to establish guarantees which are mutually satisfactory.

In trade with Western industrialized nations, the Soviet Union normally prefers barter transactions which exchange raw materials and semi-manufactured goods for imports. The U.S.S.R. must get medium- or long-term financing when the value of imports exceeds the industry's allotment of foreign exchange. Export-Import Bank financing of U.S. exports to the U.S.S.R. is available for part of the value of the sale. When financing imports, the U.S.S.R. generally insists on long-term contracts at a fixed interest rate. Exporters to the U.S.S.R. frequently increase their product price to cover the risk of interest rate fluctuations.

Technical Requirements

The characteristics of the U.S.S.R.'s electric power supply in Moscow and other major cities are 127/220 volts, 50 hertz, single and 3-phase. The metric system is in general use.

U.S. standards for materials handling equipment are generally acceptable in the U.S.S.R. The recommendations on standards made by the Standardization Commission of the Council for Mutual Economic Assistance are generally adopted by the U.S.S.R. and other member states. Detailed information on technical requirements may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

Official statistics of the U.S. Bureau of Census annual publication, *Exports, Commodity by Country, FT-410,* show in detail in table 3 U.S. exports of materials handling equipment to the U.S.S.R. in selected years.

Table 3.—U.S. exports to the U.S.S.R. of materials handling equipment, 1969-72

(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying (LLC) equipment				
Parts for overhead cranes	—	9	—	—
Other cranes, unmounted	3	3,012	—	—
Other cranes, parts	—	1,355	1,759	82
Subtotal, cranes and parts	3	4,376	1,759	82
Hoists	3	—	—	—
Parts for hoists	2	—	—	—
Parts, LLC equipment	—	68	20	195
Hydraulic jacks, parts	—	—	—	38
Other lifting equipment	346	—	16,370	—
Subtotal, lifting equipment	351	68	16,390	233
Conveyors NEC	71	—	—	985
Parts for conveyors	9	—	1	920
Subtotal, conveyors and parts	80	0	1	1,905
Used and rebuilt tractor shovel loaders (TSL)	—	—	—	31
Subtotal, leaders and used TSL	0	0	0	31
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	—	143	—	30
4-wheel drive, over 3.5	—	60	—	1,508
Subtotal, wheeled TSL	0	203	0	1,538
Total, lifting, loading, and conveying equipment	434	4,647	18,150	3,789
Industrial vehicles (IV)				
Electric-powered IV	82	—	—	—
Other-powered IV (except gasoline)	—	—	—	185
Parts for IV	—	—	—	—
Total, Industrial vehicles	82	0	0	216
Total, materials handling equipment	516	4,647	18,150	4,005
Tracklaying and other equipment				
TSL tracklaying				
Over 89.9 eng. H.P.	—	233	—	—
Subtotal, tracklaying TSL	0	233	0	0
Parts for underground leaders	96	126	8	65
Oil field rod-lift equipment	73	—	—	—
Other oil field lift equipment	—	—	—	1,333
Subtotal, other equipment	169	126	8	1,398
Total, tracklaying and other equipment	169	359	8	1,398
Grand total, mechanical handling equipment	685	5,006	18,158	5,403

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration (DIBA-264), Washington, D.C. 20230:

"The Market for Materials Handling Equipment and Systems in the U.S.S.R.," DIB 73-12-516, June 1973.

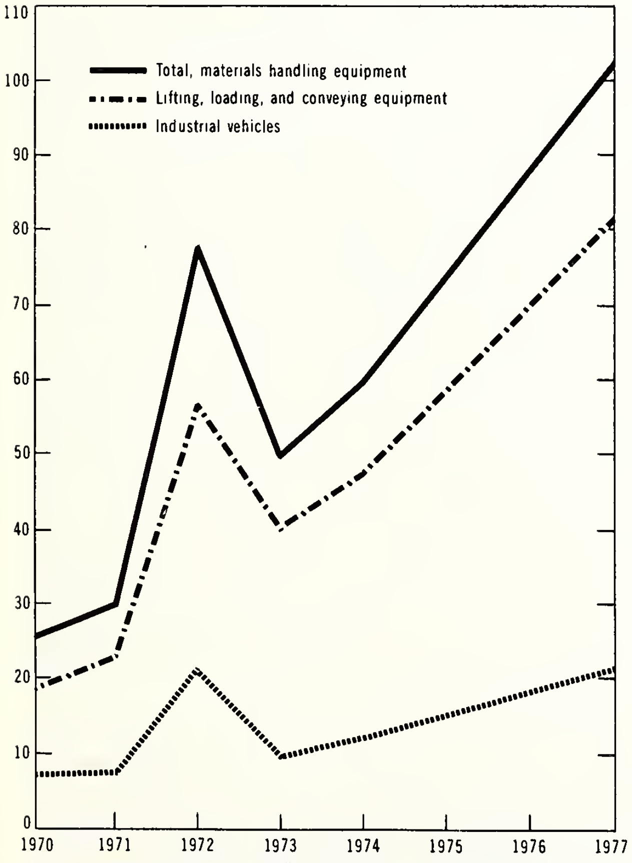
Venezuela

The drive to develop basic industries in order to reduce Venezuela's dependence on petroleum helped push sales of materials handling equipment and systems (MHE&S) to record levels in 1972 and should result in annual sales of $102 million by 1977.

Heavy spending on government-financed projects prior to the 1973 presidential election, coupled with stockpiling of MHE&S by importers in anticipation of higher import duties, boosted MHE&S purchases to nearly $78 million in 1972, up sharply from $30 million in 1971 (see table 1).

Venezuela: Size of market for materials handling equipment, 1970-72, and projected 1973-77

(in millions of U.S. dollars)



Source: Market research by the Office of International Marketing, U.S. Department of Commerce, official Venezuelan statistics, and trade estimates.

Sales of $50 million are predicted for 1973, and an average annual growth rate of 20% is forecast for the 1974-77 period.

Venezuelan users spent an estimated $57 million on lifting, loading, and conveying equipment in 1972, more than twice their 1971 expenditures of $23 million. Purchases of these products are expected to reach $81 million by 1977.

Spending for industrial vehicles, which averaged only $7 million in 1970 and 1971, jumped to an estimated $21 million in 1972. From some $10 million in 1973, industrial vehicle sales are expected to resume their upward trend and again reach $21 million in 1977.

Venezuela traditionally depends on foreign suppliers for most of its MHE&S requirements. Imports in 1972 were $71 million, up dramatically from $25 million in 1971. By 1977, MHE&S imports are forecast to reach $83 million. Imported materials handling equipment, which accounted for over 90% of domestic sales in 1972, is expected to represent at least 80% of the market each year during the 1973-77 period.

The United States is Venezuela's principal source of *materials* handling equipment and systems. Exports of American-made *mechanical* handling equipment to Venezuelan consumers totaled $15.6 million in 1970 and $13.1 million in 1971 (see table 2).

The United States in 1971 claimed a 47% share of Venezuela's MHE&S import market. The same

Table 1.—Venezuela: Size of the market for materials handling equipment, 1970-72
(in millions of U.S. dollars)

	1970	1971	1972[1]
Lifting, loading, and conveying equipment			
Production	4.0	5.0	8.0
Imports[2]	14.4	17.6	50.0
Exports	—	—	1.4
Market size[3]	18.4	22.6	56.6
Industrial vehicles			
Production	—	—	—
Imports[4]	7.4	7.2	21.0
Exports	.4	.1	—
Market size	7.0	7.1	21.0
Totals, materials handling equipment			
Production	4.0	5.0	8.0
Imports	21.8	24.8	71.0
Exports	.4	.1	1.4
Market size	25.4	29.7	77.6

[1] Bureau of International Commerce estimates based on market research.

[2] Does not include parts imported separately for elevators and hoists, cranes, and all other conveying and lifting equipment except jacks. The value of these parts is estimated to represent up to 20% of the total import value of lifting, loading, and conveying equipment.

[3] Market size equals production plus imports minus exports.

[4] Does not include the value of parts imported separately, which is estimated to represent 10% of the total import value of industrial vehicles.

Source: Production values based on data from industry trade sources. Foreign trade values based on data from *Boletin de Comercio Exterior,* 1970 and 1971.

level of participation in the import market in 1977 would mean sales of $39 million.[1]

Future U.S. shares should reflect the improved price competitiveness of American products resulting from global economic and monetary developments occurring since 1971.

Italy and France substantially increased their MHE&S sales to Venezuela between 1969 and 1971. Italy's share of the market rose from 8 to 16% and France's share climbed from 2 to 13%. Germany and Switzerland consistently ranked fourth and fifth during the same period. Germany held a 9% share in 1971 and Switzerland a 3% share.

Statistics taken from *Exports, Commodity by Country,* FT-410, an annual publication of the U.S. Census Bureau, show in detail U.S. exports to Venezuela of materials handling equipment in selected years (see table 3).

Specific Sales Opportunities

Opportunities for increased sales of materials handling equipment and systems in Venezuela are unprecedented as the country begins to make major strides in establishing basic industries and in modernizing and expanding its air, sea, and land transportation networks.

Aware that its economy has been too dependent on petroleum, Venezuela is turning its attention to the exploitation of other natural resources, particularly iron ore. The establishment of a domestic petrochemical industry will help Venezuela benefit more fully from its position as a major oil producer.

Substantial progress already has been made in reducing the nation's dependence on imports of processed foods and other consumer goods. Further steps are to be taken in this direction, including granting of incentives to industries that show promise of competing successfully in export markets.

Highway and residential construction also are booming, and port facilities are being modernized. Renovation of passenger and freight terminals at Maiquetia Airport, Caracas, is nearly complete, and work on the Caracas subway is scheduled to begin soon.

All this activity has not obscured the need for modernization of Venezuela's existing plants and equipment, even though such plants and equipment already rank among the most mechanized in Latin America. Industry is going ahead with plans to expand the use of labor-saving processes despite concern in some quarters over the level of employment. High labor costs provide a strong incentive for industry to seek ways of lowering production expenses. Venezuela has found that its labor costs are considerably higher than those of her partners in the Andean Common Market.

Sales opportunities for American manufacturers of the following products have been identified by the market research study recently conducted in Venezuela for the U.S. Department of Commerce.

Lifting, Loading, and Conveying Equipment

- Cranes, all types
- Hoists

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[1] Because of stiff price competition from Europe, Japan, and Brazil for publicly financed major projects, Venezuelan market analysts project a conservative 30% U.S. share through 1977. This would represent $25 million in that year. See also *End-User Analysis* and *Competitive Environment* sections of this Survey.

- Belt conveyors
- Bucket conveyors
- Roller conveyors
- Screw conveyors
- Components for the assembly of belt, roller, wheel, and bucket conveyors
- Elevators
- Four-wheel-drive integral tractor-shovel loaders
- Hydraulic cranes, truck mounted

Industrial Vehicles

- Forklift trucks
- Large-capacity motorized handlift floor trucks

Systems and Specialized Equipment

- Package and container coding and decoding systems
- Bin-level indicating systems
- Vibrating feed systems

Lifting, loading, and conveying equipment. — Conveyors are by far the most widely used type of lifting, loading, and conveying equipment in Venezuela. Imported conveyors are preferred over the less sophisticated domestically produced conveyors because of their special design features. Venezuelan customers prefer to buy from American manufacturers because they offer the widest variety of equipment and the greatest degree of flexibility in meeting the modest needs of Venezuela's relatively small industrial enterprises.

Cranes are one of the best selling items of American-made materials handling equipment in Venezuela They are being bought mainly by the construction and primary metals industries, the port authorities, and other industries that handle bulk or heavy materials and products. The superior durability and performance of U.S. equipment, plus the availability of high-capacity cranes, have led Venezuelan users to buy more than half of their foreign-made cranes from the United States.

Hoists, particularly the smaller sizes, are widely used in Venezuela and in many instances perform functions that are otherwise more suited to cranes. Here again, American equipment is preferred because of its durability and performance and because of the wide variety of designs available to meet specialized requirements. Elevators also are widely used, although, since Venezuela has no shortage of land for industrial use, new plants are usually single-level structures.

Industrial vehicles. — Forklift trucks have the widest use of any industrial vehicle, and there has been considerable customer resistance to substituting platform trucks and other types of specialized vehicles for the popular forklift.

Venezuelan warehouses and storage areas are designed with the traditional forklifts and hand-powered floor trucks in mind. Because of the relatively high cost of electricity, gasoline- and diesel-powered forklifts are preferred over electrically powered forklifts, except for use in poorly ventilated areas.

Despite strong price competition from non-U.S. sources, particularly Japan, U.S. forklifts are preferred on the basis of their performance, durability, and excellent local service facilities. U.S. competitiveness should be aided by floating exchanges and by the lower U.S. rate of inflation, compared to that of other major industrial nations.

While motorized handlift floor trucks are assembled in Venezuela under license from a U.S. manufacturer, significant export sales opportunities exist for large-capacity floor trucks of American manufacture.

Systems and specialized equipment.—Demand for package coding and decoding equipment is strong. Venezuelan industries that manufacture packaged consumer products are increasing their output to meet rising domestic needs previously met by imported goods. Most package coding and decoding equipment is purchased as part of a processing equipment package, a situation that favors U.S. manufacturers.

Bin-level indicators will be purchased in increasing numbers as Venezuelan port facilities are ex-

Table 2.—Exports of mechanical handling equipment to Venezuela by principal suppliers, 1969-71[1]

(in millions of U.S. dollars)

	1969		1970		1971	
	Market value	Share percent	Market value	Share percent	Market value	Share percent
United States	16.3	70.2	15.6	60.2	13.1	47.0
Italy	1.8	7.8	3.3	12.7	4.5	16.1
France	.5	2.2	1.4	5.4	3.7	13.3
Germany	1.4	6.0	1.4	5.4	2.4	8.6
Switzerland	.5	2.2	.9	3.5	.9	3.2
Others	2.7	11.6	3.3	12.8	3.3	11.8
Total	23.2	100.0	25.9	100.0	27.9	100.0

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[1] In comparing market shares held by major supplier countries, export data published by the Organization for Economic Cooperation and Development (OECD) for *mechanical* handling equipment was used to permit a uniform presentation of statistics in table 2 in individual Surveys comprising the Global Market Survey. OECD reporting countries include most major suppliers of *materials* handling equipment. The relationship of materials handling equipment to the broader category mechanical handling equipment is shown in table 3.

Source: *Trade by Commodities*, Series C, Volume III, 1969, 1970, and 1971, published by OECD, based on data supplied by the Statistical Office of the United Nations. OECD consists of the principal Western European nations and the United States, Canada, and Japan.

panded and modernized to handle the importation of grains and other bulk agricultural commodities. The food processing and chemical products industries both prefer U.S. bin-level indicators for their greater adaptability and accuracy.

Suppliers of vibrating feed equipment should find increased sales opportunities as Venezuelan feed producers continue to raise the level of mechanization in their production processes. Users consider U.S. vibrating feed equipment to have unique features and to offer the greater capacity needed for large operations.

End-User Analysis

The primary metals and petrochemical industries, which have received high priorities from the government for development and expansion, lead the rest of Venezuelan industry in current and planned expenditures for materials handling equipment and systems.

In 1972, when MHE&S sales received an extraordinary boost from the traditional preelection influx of government funds into public works and other projects, MHE&S expenditures by the primary metals and petrochemical industries approached $30 million. MHE&S purchases by these two sectors combined are forecast at $11 million in 1973 and $14 million in 1974.

Other sectors of the Venezuelan economy that together may spend $11 million in 1973 and $13 million in 1974 on MHE&S include the food industry, chemical industry, and port authorities.

Venezuelan industry uses materials handling equipment primarily to perform basic functions related to production and warehousing. Most manufacturers rely on a combination of conveyor systems, forklift trucks, and manual labor, using cranes, hoists, and industrial tractors where needed.

The more complex and automated systems have scarcely been introduced in Venezuela, where most firms are still relatively small. Users generally prefer to purchase additional units of traditional equipment than to invest in specialized and advanced equipment and systems.

The Federal Government plays an important role in determining the pattern of investment in Venezuelan industry. Assistance is given to enterprises deemed vital to the national interest, particularly those with products that replace imported goods or that are potentially exportable.

The Federal Government also owns many companies, either outright or through joint ventures. Two of the governmental entities whose activities can sometimes affect the level and type of materials handling equipment purchased by industrial firms are the Venezuelan Development Corporation (CVF) and the Venezuelan Petrochemical Institute (IVP).

Even when the CVF and IVP do not have direct responsibility for equipment purchasing, their policy decisions determine the amount of money available for the expansion and modernization of industrial production facilities and determine which firms will benefit from special government loans and grants.

Government corporations often obtain financing through such international lending organizations as the Inter-American Development Bank and frequently negotiate package purchases. There are indications that in the procurement decisions of public corporations capital leverage considerations outweigh many other factors that are considered more important by private buyers.

Primary metals.—Some 60 firms were engaged in the production of iron, steel, and nonferrous metals in Venezuela in 1970. Although 1971 output amounted to only $170 million, 89% of which was from ferrous metals, the industry's future is very bright. To broaden Venezuela's economic base, the government is giving high priority to the extraction of iron ore, which is the nation's second most plentiful natural resource, and hopes to increase the output of metal products with a view toward eventual exportation.

The industry is dominated by a single government-owned firm, Siderurgica del Orinoco, C.A. (SIDOR), a division of the Venezuelan Guyana Corporation, backed by CVF. Most of its plants are located in the eastern part of the country, with several centered in the area of Puerto Ordaz. SIDOR had 6,500 employees and a total investment of $778 million in 1972.

Construction was started in 1971 on a new $290 million plant that will be capable of turning out 847,000 tons of tin, chrome, and other products each year. SIDOR hopes eventually to export 11,000 tons annually. Financing for the first two stages of the plant was provided by the U.S. Export-Import Bank and by German and Belgian banks. The machinery was supplied primarily by Wean Industries of Pittsburgh, Pa.

Recent additions to its physical plant increased SIDOR's annual output of crude iron from 935,000 to 1.3 million tons. The additional capacity needed to boost yearly output to more than 3 million tons will be available in 1974. Funds totaling $40 million have been appropriated for expansion of other production units and for expansion of SIDOR's port facilities so they can handle 1.3 million tons per year.

CVF also finances private metals producers. One such firm, Hevensa, recently completed a $1.8 million plant and plans to invest a similar sum in another facility.

Heavy investments in materials handling equipment are necessary in the basic metals industry, and SIDOR and other metals producers are among Venezuela's leading purchasers of advanced materials handling equipment, principally remote-controlled hoists and high-capacity cranes.

When public spending reached record levels in 1972, the industry's MHE&S purchases were estimated at $14 million; they are forecast to total $6 million in 1973 and $8 million in 1974. Most purchases will be made through international competitive procurement.

Petrochemicals.—Venezuelan production of petrochemicals is getting underway after a decade of planning and experimentation. The facilities that are being constructed on a 3-square-mile site at El Tablazo on the eastern shore of Lake Maracaibo constitute the most ambitious industrial undertaking in the country and represent an unprecedented opportunity for suppliers of materials handling equipment and systems. While the expected total cost of the complex has not been made public, estimates place it in excess of $1.5 billion.

The Venezuelan Petrochemical Institute, a government agency, is coordinating the development of the El Tablazo complex. Individual plants operated as joint ventures by IVP and private groups will convert the raw materials supplied by the Venezuelan Petroleum Corporation (CVP), another government-owned company, into petrochemical products.

The first stage of construction is scheduled to be completed by 1974 at a cost of $455 million. It will include at least five separate companies, some with more than one plant. Two plants—Venezolana de Nitrogeno, C.A. (known locally as Nitroven) and Estireno de Zulia, C.A. (Estizulia)—began operating in December 1972, and much of the infrastructure for the complex has been built.

Upon completion of the first stage, El Tablazo will have the capacity to produce 1.2 million tons or urea, halogens, and polystyrene and other plastics per year. The second stage, to be completed by 1976, will cost $500 million. The remainder of the complex is scheduled to go on stream in 1980. U.S. investors are participating in nearly all the joint ventures.

Approximately $15 million was spent in 1972 on materials handling equipment for El Tablazo, including port facilities and other infrastructure works. MHE&S expenditures for 1973 were forecast at $5 million and for 1974 at $6 million.

All equipment is being bought on the world market through competitive bidding. Some of the materials handling equipment will be purchased as part of the processing equipment, but separate contracts may be awarded for such items as cranes, conveyor systems, forklift trucks, and floor trucks.

Although advanced equipment is to be used at the port and in the storage and transportation of products, little automation is slated to be employed in the handling of finished products, reflecting official concern that the complex shall provide a substantial number of additional jobs for Venezuelan workers.

Food and kindred products.—This industrial sector is composed of 1,600 companies engaged in processing and canning meats, fish, fruits, and vegetables; producing cereals, bakery products, chocolate, and confections; refining sugar; and manufacturing milk products.

Output of food and kindred products was valued at $1.4 billion in 1971, accounting for nearly 23% of Venezuela's total industrial production and contributing 7% of its gross national product in that year. During the 1969-71 period, the food industry's value of production increased at annual rates ranging from 5 to 6.7%; future expansion is forecast at 6% per year.

Capital investment has shown a less stable pattern but can be expected to increase 5 to 6% annually. There is increasing government interest in aiding areas of the food industry with products that can be exported, such as sugar, meat and fish, and tropical fruits.

The food and kindred products industry spent some $5.4 million on materials handling equipment in 1972. Spending was projected at $4.1 million for 1973 and $5.1 million in 1974. Demand will be particularly strong for cranes for use in sugar mills; bucket, screw, or roller conveyors for grains, semifluids, and liquids; simple handlift floor trucks; bin-level indicators; and package coding and decoding systems.

The C.A. Central Rio Yaracuy, one of several CVF-owned sugar mills opened in February 1973, is an example of government participation in the development of the food processing industry. Established with an initial investment of approximately $13 million, the mill processes 3,000 tons of sugarcane daily.

The Yaracuy mill is equipped with the most modern materials handling equipment used by Venezuelan sugar mills. Most of the equipment was bought as part of a turnkey package from Millers-Watson, Ltd., a British milling equipment manufacturer. The critical factors in the transaction reportedly were short advance notice given to prospective bidders and the financial terms featuring capital leverage and 2 years' grace followed by 10 years' amortization at 7% per year.

At the Yaracuy plant, a large hoist mounted on overhead rails receives the incoming sugarcane. Fluid elevators and belt conveyors move the cane and its intermediate products through the production process. A combination of conveyors and forklift trucks transports and stores the bulk containers of refined sugar.

Plans for increasing the Yaracuy mill's capacity from 4,000 to 7,000 tons daily already have been approved. This expansion was scheduled to begin late in 1973 and require an additional investment of an estimated $8 million. Of that amount $2 million may be spent on such materials handling equipment as conveyors, liquid elevators, cranes, and forklift trucks.

Chemicals and allied products.—Nearly 300 Venezuelan firms produced basic industrial chemicals, industrial fats and oils, paints, pharmaceuticals, detergents, cosmetics, and allied products in 1971. Production in 1971 was valued at $337 million, representing 6.2% of Venezuela's total industrial production. Growth during the 1969-71 period averaged 7 to 8% annually; 7.5% is considered a probable growth rate for the immediate future.

Recent figures on total capital investment in the chemical industry are not available. It is reported that foreign investment has increased substantially in recent years, with most of the funds supplied from U.S. sources. Trade estimates indicate that capital investment in the near future should increase about 10% a year, with the bulk going to the industrial chemicals sector.

Although firms in the chemicals industry boast some of the most advanced materials handling systems in Venezuela, their operations generally are based on the traditional combination of conveyors, forklift trucks, and manual labor. Sales volume at this time does not warrant the installation of more advanced machinery and, except among pharmaceutical and detergent manufacturers, limited competition removes the incentive to improve products and increase manufacturing efficiency. Should it become essential to achieve lower unit costs, the first priority is likely to be the automation of production processes rather than modernization of materials handling procedures.

The chemicals and allied products industry spent an estimated $5.4 million on materials handling equipment in 1972. Purchases are expected to total $4 million in 1973 and $5 million in 1974.

Since companies are constantly using a wider variety of raw materials and developing more specialized products, new conveyor systems that are custom-designed for each operation will be required. Increased demand is expected to result from the completion of additional production facilities. More versatile and higher capacity forklift trucks will be sought, and small- and medium-size firms, especially pharmaceutical companies, will purchase larger floor trucks.

Stiffer government regulations will increase the need for manufacturers to maintain close control over production dates and batch numbers, thereby stimulating additional demand for package coding and decoding systems.

One of the most dynamic companies in Venezuela's chemicals and allied products industry is Proctor and Gamble de Venezuela, C.A. The company is expanding its production facilities in order to broaden its product line. Most of the estimated $6 million invested in the project will be spent for new equipment, with as much as $1 million allocated for materials handling equipment, mainly conveyors, forklifts, and floor trucks.

Lifting, loading, and conveying equipment now in use at Proctor and Gamble includes rubber and textile belt conveyors with sanitary coatings, stainless steel chain conveyors for moving packaged goods, screw and pneumatic conveyors for transporting granular materials, bucket conveyors for conveying semiliquids, and roller conveyors for moving packaged products to storage areas. The repair shop is equipped with a bridge crane for handling heavy machinery.

P&G's fleet of industrial vehicles includes forklifts, handlift and platform trucks, and industrial tractors. Systems and specialized equipment being used by P&G include vibrating feed systems, bin-level indicators, and package and container coding and decoding systems.

Port authorities.—Venezuela has 22 ports which handle international shipments of goods. Four of these each handle more than 1 million tons of general cargo each year. Six ports that deal almost exclusively in petroleum products each move more than 20 million tons of cargo annually.

Puerto Cabello and La Guaira, the latter serving Caracas and the central region of the country, are the two most important general cargo ports. Some 1,700 ships called at La Guaira in 1972, loading or unloading 1.4 million tons of goods. In the same year, 1,200 ships called at Puerto Cabello, which handled 2.1 million tons of cargo. During the 1968-72 period, the volume of cargo passing through La Guaira rose by an average annual rate of 11% and through Puerto Cabello by 17%.

The increased freight volume has severely strained port facilities, especially those at La Guaira. The government in 1972 took steps to ease the pressure. Approximately $4 million of materials handling equipment was put into service at La Guaira early in 1973. Most of this money was spent on forklift trucks of 6,000- to 25,000-pound capacities, cranes of 10- to 50-ton capacities, and industrial tractors. Pneumatic conveyors for use in grain elevators also were purchased.

The Ministry of Treasury, which administers the ports, reportedly spent $6 million on materials handling equipment and systems for Venezuela's ports in 1972. Spending is forecast at $2.5 million in 1973 and $3 million in 1974. Significant sums will be spent on the renovation and expansion of facilities at Puerto Cabello, Maracaibo, and Puerto Ordaz, as well as for further improvements at La Guaira.

Table 3.—U.S. exports to Venezuela of materials handling equipment, 1969-72
(in thousands of U.S. dollars)

Brief description of product	1969	1970	1971	1972
Lifting, loading, and conveying equipment				
Overhead cranes, etc.	198	49	152	194
Parts for above	115	111	125	141
Other cranes, unmounted	1,282	631	1,522	425
Other crane parts	126	168	420	221
Subtotal, cranes and parts	1,721	959	2,219	981
Hoists	603	436	408	422
Parts for hoists	123	139	233	145
Derricks	—	—	—	—
Winches	138	274	204	163
Parts for above, etc.	386	410	197	367
Hydraulic jacks, parts	50	38	80	104
Other jacks and parts	38	24	61	59
Other lifting equipment	175	139	156	1,913
Subtotal, lifting equipment	1,513	1,460	1,339	3,173
Elevators, escalators	39	20	24	32
Parts for above	70	90	190	156
Gravity conveyors	106	16	23	37
Overhead conveyors	55	41	4	61
Pneumatic conveyors	57	17	41	101
Wheeled conveyors	35	4	3	—
Other conveyors	1,165	1,613	941	1,171
Parts for conveyors	5,066	2,409	722	691
Subtotal, conveyors and parts	6,593	4,210	1,948	2,249
Used and rebuilt tractor shovel loaders (TSL)	486	280	90	196
Front-end loaders for mounting on TSL	128	27	32	22
Subtotal, loaders and used TSL	614	307	122	218
Tractor shovel loaders (TSL) with bucket size in cubic yards				
2-wheel drive, all	40	7	67	351
4-wheel drive, -1	44	384	623	750
4-wheel drive, 1.-1.49	124	164	53	50
4-wheel drive, 1.5-1.99	130	111	281	1,220
4-wheel drive, 2-2.49	103	251	696	798
4-wheel drive, 2.5-3.49	394	909	619	1,024
4-wheel drive, over 3.5	649	1,052	357	398
Subtotal, wheeled TSL	1,484	2,878	2,696	4,591
Total, lifting, loading, and conveying equipment	11,925	9,814	8,324	11,212
Industrial vehicles (IV)				
Walking and powered IV	20	31	9	51
Electric-powered IV	15	100	10	48
Gasoline-powered IV	1,266	1,294	637	773
Other-powered IV	139	432	110	404
Portable stackers	98	23	4	48
Parts for above	605	503	498	782
Total, industrial vehicles	2,143	2,383	1,268	2,106
Total, materials handling equipment	14,068	12,197	9,592	13,318
Tracklaying and other equipment				
TSL, tracklaying				
20-44.9 engine horsepower	—	—	14	39
45-59.9 engine horsepower	—	—	89	—
60-89.9 engine horsepower	17	17	—	134
Over 89.9 engine horsepower	412	349	622	747
Subtotal, tracklaying TSL	429	366	725	920
Underground loaders	38	—	18	—
Parts for above	1	2	11	—
Oil field rod-lift equipment	171	2,266	3,035	1,190
Oil field derrick pts.	67	282	280	149
Other oil field lift equipment	1,145	401	616	176
Farm elevators	264	4	47	14
Parts for farm elevators	—	1	2	38
Automobile lifts	70	71	46	36
Underground mine conveyors	—	—	—	—
Subtotal, other equipment	1,756	3,027	4,055	1,603
Total, tracklaying and other equipment	2,185	3,393	4,780	2,523
Grand total, mechanical handling equipment	16,253	15,590	14,372	15,841

Port congestion will be relieved primarily by the use of additional cranes, forklifts, tractors, and other traditional equipment, rather than through the introduction of containerization and other advanced methods of materials handling that face opposition from the dockworkers' union.

Competitive Environment

The manufacture of materials handling equipment in Venezuela consists primarily of assembling lifting, loading, and conveying equipment from imported components under license. Output of the 12 domestic producers was estimated at $8 million in 1972; the 1977 forecast is for $25 million, including $500,000 for industrial vehicles. Metal framing is the most important local component; most other components are imported.

Conveyors are the most important product of the domestic MHE&S industry, which also makes tower cranes, elevators, and manual floor trucks. Venezuelan materials handling equipment assembly plants operate under licensing agreements with such foreign manufacturers as Rapistan, Inc., Big Joe, Atlas Conveyor Co., and Diebold, Inc. of the United States; SEAM, EDILGRU, FIAM and Piccini of Italy; and Kone and H&S of Germany.

Manufacturers plan to increase their production of conveyors and to offer a wider selection of models. There also is considerable interest in elevators. Imery, S.A., plans to begin large-scale production under license from Westinghouse (U.S.) and Mitsubishi (Japan). Production of fixed and tower cranes may also be expanded.

Tariffs are Venezuela's principal means of protecting its domestic manufacturers from foreign competition. The revised tariff schedule of May 1973 substantially replaces the old system of import quotas, licenses, and specific duties with a range of ad valorem duties. Products are now classified according to the Brussels Tariff Nomenclature.

Materials handling equipment is dutiable at rates ranging from 1 to 80%, with most tariffs falling in the 10 to 30% range. In addition, consular fees of 2 to 3.5% of the f.o.b. value are charged on shipments arriving by sea. The consular fee is not levied on air shipments, but a 2% airport tax is assessed on the f.o.b. value of the shipments.

Information on specific duty rates may be obtained from the Domestic and International Business Administration (DIBA-242), U.S. Department of Commerce, Washington, D.C. 20230.

The ability of MHE&S suppliers to offer liberal credit terms to private Venezuelan buyers usually is not of critical importance. Most buyers can arrange to make an initial payment at the time the goods are shipped and to pay the remainder within 30, 60, or 90 days of delivery. However, financial terms frequently are a vital consideration on large government package contracts.

Venezuela's numerous subsidiaries of foreign firms often place their MHE&S orders through the home office or through other overseas purchasing agents, a situation that benefits American MHE&S manufacturers, since many of the international firms active in Venezuela are headquartered in the United States.

Suppliers new to the Venezulean market should attempt to identify these relationships so as to direct their promotional efforts to the most appropriate party. Directories published by the American Chamber of Commerce, the Venezuelan *Camara de Industriales,* and other organizations can be helpful.

Suppliers wishing to sell materials handling equipment and systems to the Venezuelan Government or to publicly owned corporations must register with each such prospective buyer. On the basis of information given at the time of registration, the entity planning to purchase equipment will solicit bids from those firms that they consider best qualified to supply the particular item.

Technical Requirements

Venezuela's electric power characteristics are 110/220 volts, 60 hertz, 1- or 3-phase, 2- or 3-wire. The supply of electricity is considered adequate in most regions of the country. Voltage variations are kept at a minimum, and interruptions of service necessitated by repair or installation work are normally announced in advance.

Venezuela uses the metric system of weights and measures, but the English system is understood. All documents supplied in connection with government purchases or for customs purposes must state equipment specifications in metric terms.

The Venezuelan Government has no official standards for materials handling equipment and systems. Equipment that meets U.S. standards is acceptable. Standards now being developed by the Ministry of Public Works for its own use might eventually be applied to equipment purchased by other government agencies. Detailed information on technical requirements may be obtained from the American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.

The following market research is available on loan from the U.S. Department of Commerce, Domestic and International Business Administration, Room 1617-M Main Commerce Building, Washington, D.C. 20230.

"The Market for Materials Handling Equipment and Systems in Venezuela," DIB 73-11-504.

Country Market Briefs

The Country Market Briefs were prepared by the commercial sections of the U.S. Embassies and Consulates in the countries surveyed. The reports are published in their entirety, except where the original reports included statistical tables or other information too detailed for publication.

Colombia

Colombian production of materials handling equipment and systems is limited to the manufacture of screw, belt, roller, and pneumatic conveyors with up to 100 tons capacity, as well as cranes, hoist elevators, and pneumatic packs. There are approximately 10 manufacturers, most of which are located in the Bogota area. These firms have been stepping up their production since 1970.

Some components, such as conveyor belts, are imported from the United States and Europe. Manufacturing under license is quite common, with a notable inclination for U.S. brands. Colombia's 1970 imports of this equipment, including industrial vehicles, amounted to $11,894,000, of which 43% was from the United States. Imports at the end of 1972 were down to $7,896,000, with a U.S. share of 32% (see tables 1 and 2).

It is estimated that the existing market potential for these products, which was up to $13,936,000 in 1970, will reach $16,272,000 by 1973 due to the increased flow of funds to the construction industry. Many projects initiated in late 1972 only began to have impact in 1973. Government stimulation of exports of cement, tobacco, cotton, sugar, lumber and other wood products, animal products, and chemicals will certainly increase demand for materials handling equipment and systems. By 1977, Colombia also will be exporting significant quantities of coal and nickel.

Imports of elevators, lifts, and hoists increased from $1,658,000 in 1970 to $3,277,000 in 1972, with U.S. shares of 25% and 15%, respectively. It is estimated that Colombian imports of this equipment will reach approximately $4 million by 1975.

There is, on the other hand, a significant scarcity of materials handling systems. These systems are in very limited demand by local industries.

The Colombian economy, on balance, registered a very good year in 1972. Preliminary data indicate a real increase of 7.1% in GDP. The key agricultural sector increased 5.5%. The manufacturing sector, although offering mixed performance, showed an overall increase of 9.6%.

The major area of improvement in the economy was in the trade sector. Export registrations, stimulated by domestic promotion increases and by high world prices, were up 29% over 1971. This represented an increase of 66% in minor exports, which now account for almost half of the total, and a slight increase in coffee exports. Imports, on the other hand, were sluggish, despite government efforts late in the year to stimulate imports and the utilization of foreign exchange.

The vigorous improvement in trade, combined with continued foreign borrowing on both concessional and commercial terms, increased Colombian foreign exchange reserves by 100%—to $345 million—at the end of 1972. This trend was continued through the first quarter of 1973, when minor exports were up 53% and coffee exports up 25%. Reserves at the end of March reached $432 million.

Statistical Analysis

Materials handling equipment and systems imports represent a very small proportion of total Colombian imports—1.3% in 1970 and barely 1% in 1971 and 1972. The higher percentage in 1970 was due to a large importation of industrial vehicles and spare parts for the construction of the Alto Anchicaya Hydroelectric Plant.

The importation of materials handling equipment and systems decreased from $12 million in 1970 to $7.8 million in 1972. This was due in part to restricted import license approval by the Foreign Trade Institute (INCOMEX) in the latter part of 1971. Imports may have been limited by the shortage of credit facilities and by increasing prices, particularly those resulting from the dollar devaluation.

Among the several steps to stimulate imports taken by the Government were the transfer of approximately 254 products from the prior license list to a free list in the first part of 1973. A Resolution from the Monetary Board, dated June 11, 1973, cancelled all prior import deposits and established in their place a compulsory deposit equivalent, at a minimum, to 10% of the f.o.b. value of the goods to be imported, as an advance payment for the total cost of the importation. This Resolution had the effect of freeing approximately 1,800 million pesos which were in the hands of the Banco de la Republica (Central Bank) as prior import deposits, thus increasing the capability of Colombian businessmen to finance imports.

The United States' share of the materials handling equipment and systems market represented 43.7% in 1970, 32.2% in 1971, and 32% in 1972 (see tables 2 and 3). Part of this decline appears related to the U.S. Government's decision to untie AID loans in mid-1971. As tied AID credits were phased out, U.S. exports resulting directly from these credits fell from $82 million in 1970 to $27 million in 1971, and to only $11 million in 1972, and the drop in tied exports does not appear to have been compensated for by an increase in regular commercial sales.

No specific commodity data are yet available, but it is suspected that the U.S. share decline in materials handling equipment and systems in 1971 and 1972 involved pulley, tackles, and jacks (84.22.A), winches and capstans (84.22.B), cranes (84.22.C.I.), lifts, hoists, and chutes (84.22.C.II), and other materials handling equipment (84.22.C.III) and (84.22.E).

Another factor behind this decrease was high U.S. prices, as compared to European and Japanese prices. The devaluation of the dollar should increase the U.S. share of the market over a period of time, but there is no hard evidence that importers have yet shifted their sources of supply.

Compensation Agreements—Another important factor is that Colombia maintains bilateral compensation (barter) agreements with several European nations. In general, Colombia exports primary goods (mainly coffee) to its compensation partners under these agreements and imports manufactured goods in return. The products which will be exchanged can be specifically listed in the bilateral agreement with the individual partner, or the range can be left relatively wide.

The central bank of each partner acts as the account manager for the bilateral transactions and, in the Colombian case, often provides favorable import financing as an inducement for local importers to purchase the goods offered by the other nation. (Spain has been the major beneficiary of these barter agreements, see table 3.)

It was estimated that Colombian imports of lifting, loading, and conveying machinery and accessories would reach $7,250,000 in 1973, with a U.S. share of around 35%; by 1975, these imports were forecast to increase to $10,200,000, with a U.S. share of approximately 40%.

It seems probable that Colombians may be turning more to domestic suppliers for some of these items previously imported, due to the increasing development of the metalworking industry and a new rental system for this equipment which is operating in the country.

Regarding industrial vehicles, the U.S. share of the market will continue to be high; it reached 71% in 1972 (see table 3), as opposed to only 50% in 1970. It is estimated that the importation of these vehicles between 1973 and 1975 will be approximately $1 million annually.

Forklift trucks with over a one-ton capacity enjoy a favorable market potential. The U.S. share should be about 60% for this period, since U.S. forklift trucks are well regarded by local end-users.

It is estimated that approximately 20% of materials handling equipment and systems imports and industrial vehicles represents spare parts for same, since available statistics do not show a breakdown between equipment and spare parts.

Demand Factors

Lifting Loading, and Conveying Equipment—The equipment most widely used in Colombia is the industrial conveyor: screw, belt, roller and pneumatic types. Materials handling equipment such as elevators and lifts is being replaced by forklift trucks, particularly among the larger industries.

The demand for this equipment depends to some extent on new industrial projects, but basically it depends on the expansion of large, established industries. The demand by semi-official and official entities is substantial, inasmuch as official entities are involved in such activities as soluble coffee, the management of all Colombian sea and air ports, telecommunications, and hydroelectric developments. All acquisitions made by these companies or entities are made through public tenders, and all bidders must be registered representatives of foreign firms.

Industrial vehicles—It is estimated that there are at least 2,000 forklift trucks operating in Colombia, with an average lifting load of 3 tons. Seventy percent of these are of U.S. origin. There is a marked tendency in Colombian industry to utilize more of this type of materials handling equipment, since manual labor costs are going up and these trucks are quite functional for the type of warehouse system implemented in the country. It is calculated that the annual demand may reach $1 million between 1973 and 1975.

Systems and Specialized Equipment—There is only a limited demand for such equipment in Colombia. The reason is that local industry has little technical information regarding new operational systems. It seems that production and warehouse local managers believe that a few lift trucks and conveyor systems are more than sufficient to handle their materials handling needs. The majority of companies interviewed showed a lack of knowledge regarding the newest and most sophisticated systems. The only exception to this situation is the Colombian Port Authority (Empresas Puertos de Colombia), which utilizes the most advanced materials handling systems.

Sales Potential

There exists a significant demand for the following materials handling equipment and systems, listed in order of importance:

Forklift trucks
Conveying equipment
Conveyor belts
Lifts
Pulley tackles and jacks
Cranes

Forklift Trucks—There exists a substantial but sporadic demand for these vehicles. The current

Table 1—Colombia: Production, Imports and Exports of Materials Handling Equipment 1970-1975

(in thousands of dollars)

	1970	1971	1972	1973 (Est.)	1974 (Est.)	1975 (Est.)
Total Production	2,003	2,725	3,090	3,463	4,021	4,739
Roll, belt and screw conveyors	670	1,130	1,493	1,574	2,013	2,600
Pulley tackles and jacks	203	420	437	725	779	840
Cranes	886	923	939	959	1,029	1,115
Lifts, hoists, and elevators	244	252	221	205	200	184
Other Equipment	—	—	—	—	—	—
Industrial vehicles	—	—	—	—	—	—
Total Imports	11,982	9,096	7,896	8,544	9,936	12,196
Roll, belt and screw conveyors	2,279	1,311	611	367	220	132
Pulley tackles and jacks	1,222	848	625	437	306	214
Cranes	1,656	1,127	589	412	288	202
Lifts, hoists, and elevators	1,658	3,346	3,277	3,604	3,964	4,161
Other Equipment	1,121	889	1,626	2,439	3,658	5,487
Industrial vehicles and parts	4,046	1,575	1,168	1,285	1,500	2,000
Total Exports	49	176	308	515	593	663
Roll, belt and screw conveyors	—	—	25	65	63	63
Pulley tackles and jacks	49	146	142	150	180	200
Cranes	—	30	141	300	350	400
Lifts, hoists, and elevators	—	—	—	—	—	—
Market Size,[1] *Total*	13,936	11,645	10,678	11,492	13,364	16,272
Roll, belt and screw conveyors	2,949	2,441	2,079	1,876	2,170	2,669
Pulley tackles and jacks	1,376	1,122	920	1,012	905	854
Cranes	2,542	2,020	1,387	1,071	967	917
Lifts, hoists, and elevators	1,902	3,598	3,498	3,809	4,164	4,345
Other Equipment	1,121	889	1,626	2,489	3,658	5,487
Industrial vehicles and parts	4,046	1,575	1,168	2,285	1,500	2,000

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[1] Market Size equals production plus imports less exports.

market potential is approximately $1 million per year, there being a tendency to purchase more of those trucks in line with the rapid industrialization of the country. There is a considerable preference by local industry for U.S. trucks, primarily for trucks with a lifting capacity of 3 tons.

Conveying Equipment—This is the more common type of materials handling equipment and systems equipment used in the country, and there are a number of local assemblers and manufacturers, mainly of roller and belt conveying equipment. The belts are imported into the country and the conveyors are manufactured locally under U.S. license agreements. With an increase in local manufacture, importation will diminish. Conveyors up to a 100-ton capacity are imported, since there is no local manufacture of same.

Conveyor belts—There exists a rather good demand for these, since they are not manufactured locally. Trade sources say the demand for imported belts may soon reach $2 million a year.

Lifts, hoists and elevators—The lack of local manufacture and the fact of a construction boom point toward a growing demand for imports, particularly for CKD parts for elevators which are assembled in the country by foreign firms. In the majority of cases, these elevators are assembled at the construction site.

Parts used in the assembly of passenger or freight elevators are imported, with few exceptions. Assemblers do not carry stocks, since deliveries are made against purchase orders.

Pulley tackles and jacks—There is a rather significant demand, mainly for pulley tackles, which distributors report are reasonably priced. One local firm manufactures hydraulic jacks under a license from Sweden. Apparently this meets local demand, and thus a decrease in imports is anticipated. A more sophisticated type type of jack may be welcomed, however.

Cranes—Market potential is quite large, mainly for those cranes utilized by the construction industry. The one local manufacturer of bridge cranes fully meets local demand and even exports to some Central American countries. A decrease in production is foreseen, however, due to a tendency on the part of the building and construction contracting firms to rent these cranes instead of purchasing them.

Market Sectors

Following are the industrial sectors utilizing materials handling equipment and systems:

Food, beverages and tobacco—This sector is the largest in Colombia, with factories in the principal cities of the country. The last Industrial Census, taken by the National Department of Statistics (DANE) in 1969, shows 1,864 establishments, generating 63,258 direct jobs. Data indicate a yearly production increase of 7.2%, although this rate may accelerate in the next few years due to the expansion plans of various factories in the beverage sector, such as Bavaria, which is now planning to open two new breweries.

Also, the tobacco industry, with a new program to produce foreign brands with blended tobacco, may increase purchases of materials handling equipment and systems. It is estimated that the demand for materials handling equipment and systems for mass production, packing, labeling, and warehousing will increase substantially in years to come.

Cement Industry—This industry has been increasing significantly during the last few years, showing a respectable rate of increase of 9.9% annually. This is due largely to the increased flow of funds to the construction industry. There are 15 large cement factories in Colombia with an aggregate labor force of 4,766 employees. These plants use large quantities of materials handling equipment and systems for transport and distribution. Many cement factories are in the process of enlarging their plant, and it was expected that the rate of increase might reach 12% by the end of 1973.

It is worthwhile to note that there are other industrial sectors of the economy, such as textiles and steel, which might be potential purchasers of materials handling equipment and systems, along with the Colombian Port Authority. The Civil Aeronautics Department also may be a potential purchaser for airport equipment. Important plans are underway for developing coal and nickel deposits, and possibly petroleum as well, and this will call for extensive purchases of materials handling equipment.

Within the food, beverage and tobacco industry, mention should be made of the largest brewery in the country—Bavaria, S.A., Carrera 13 No. 28-01, Bogota, D.E., Colombia—as a potential major user of materials handling equipment and systems. Subject firm is engaged in the manufacture of beer, malt byproducts, and soft drinks. It maintains head offices and plants in Bogota, with about 15 factories, and 10 affiliated firms in Colombia. Recently it built a new plant with capacity for a monthly production of 60 million bottles of beer. This firm also plans construction of a malt plant in Bogota and will enlarge its plant in Cali. Bavaria utilizes mainly roller conveyors and forklift trucks, as well as a bottling system which is due to be renovated very shortly.

Among the cement industries, mention should be made of Cementos del Caribe, Apartado Aereo 2379, Barranquilla, Colombia, as a potential buyer of materials handling equipment and systems.

This firm is the largest producer of gray and white Portland cement in Colombia. It utilizes a considerable quantity of materials handling equipment, although none of type as modern as that used by some other industries. Since this company expands almost on a yearly basis, it should be considered as a good potential purchaser of materials handling equipment and systems.

Domestic MHE&S Industry

Local manufacture of materials handling equipment and systems in Colombia is just getting started, initially producing screw, band, roller and pneumatic conveyors, cranes, elevators and pneumatic jacks. Among these products, the one most used is the conveyor. Cranes which are mainly used in building construction have also been produced in substantial numbers, leaving a small number for export. In third place is the production of hydraulic jacks, which are being manufactured in the country by a firm under Swedish license. Local production of lifts, hoists, and elevators has been static and small and does not show possibilities of improving in the future.

Overall, prospects for the development of materials handling equipment and systems industry in Colombia seem favorable, considering that the metalworking sector is going through a promising stage of development.

Table 1 shows local production figures of subject items and production estimates through 1975, based on the trend between 1970 and 1972, and an evaluation of factors affecting Colombian production of materials handling equipment and systems. There are no possibilities, at least in the short term, of local production or assembly of forklift trucks or any specialized materials handling equipment and systems. About 40% of Colombian producers of materials handling equipment and systems are manufacturing under foreign license, and many of them expressed interest in manufacturing under American license.

Most local manufacturers of conveying equipment are also engaged in the production of other metalworking items, because local demand for general materials handling equipment and systems is still rather limited and does not fully utilize installed capacity. Local producers enjoy a price subsidy on government tenders. Local production involving payment of royalties is supervised by the Government as established by Decree 1234 of July 18, 1972, issued by the Ministry of Economic Development.

Market Development Data

General comments from local trade sources as to how U.S. suppliers of materials handling equipment

Table 2—Columbia: Imports of Materials Handling Equipment, 1970-1972
(in thousands of dollars)

	1970 *Market Share* *Value*	*%*		*1971* *Market Share* *Value*	*%*		*1972* *Market Share* *Value*	*%*
84.22 Combined Lifting, Loading, and Conveying Machinery and Accessories								
United States	3,220	40.6	United States	2,006	26.7	United States	1,695	25.2
Italy	844	10.6	Japan	1,018	13.5	Japan	978	14.7
Spain	602	7.6	West Germany	980	13.0	Italy	808	12.1
West Germany	460	5.8	Italy	746	9.9	Spain	530	7.7
Others	2,812	35.4	Others	2,772	36.9	Others	2,717	40.3
Total	7,938	100		7,522	100		6,728	100
87.07 Combined Industrial Vehicles and Accessories								
United States	2,012	49.7	United States	923	58.6	United States	830	71.0
Mexico	824	20.4	Japan	266	16.9	Japan	129	10.9
United Kingdom	680	16.8	United Kingdom	187	11.9	United Kingdom	115	10.0
Japan	221	5.5	West Germany	110	7.0	West Germany	28	2.4
Others	309	7.6	Others	89	5.6	Others	66	5.7
Total	4,046	100		1,575	100		1,168	100
84.22 and 87.07 Combined Lifting, Loading, and Conveying Machinery and Industrial Vehicles and Accessories								
United States	5,231	43.7	United States	2,930	32.2	United States	2,525	32.0
Italy	844	7.0	Japan	1,284	14.1	Japan	1,107	14.0
Mexico	842	7.0	West Germany	1,090	12.0	Italy	812	10.3
Spain	607	5.1	Italy	755	8.3	Spain	541	6.8
Others	4,460	37.2	Others	3,037	33.4	Others	2,911	36.9
Total	11,984	100		9,096	100		7,896	100

and systems could further improve supplier-customer relationships and achieve greater market penetration referred primarily to the price factor. Japanese and European prices for some imported materials handling equipment and systems equipment, namely industrial vehicles, are still below U.S. prices by about 15% and 5%, respectively.

The desirability of more and better descriptive product literature in Spanish, as well as the setting up of sales systems, such as consignment of goods in a free trade zone, were also mentioned. It seemed likely that trade promotion efforts would have a good chance of paying off.

Regulations and Trade Barriers

Existing regulations in Colombia for the importation of materials handling equipment and systems require (1) approval of an import license for some of the products listed within tariff schedule classifications 84.22 and 87.07, (2) payment of required import duties and, (3) a 10-21% down payment, which must be made to the Bank of the Republic (Central Bank) by importers when applying for import licenses. Table 4 shows different tariff numbers for materials handling equipment and systems, import duties, import system, and the abovementioned deposit percentages.

The existence of an association such as Fedemetal (Colombian Metallurgical Association), which encompasses about 90% of the metalworking firms in the country, should be mentioned in this connection. This association exercises an effective and strict control over the import of most types of metalworking and machinery items. In most cases, mainly for articles falling within the prior import license list, the Colombian Institute of Foreign Trade (INCOMEX), discusses with the Federation the possibilities of local production before giving prior approval to the required import license. In other cases, INCOMEX inquires directly with local producers. The Federation also exercises some control over which items are transferred to the free import license list.

The so-called Pacto Andino, or Andean Pact,

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[1] Hectare = 2.47 acres.

comprising Colombia, Ecuador, Peru, Chile, Venezuela, and Bolivia, must be considered as another important non-tariff barrier for the importation of materials handling equipment and systems. These countries established this economic-commercial bloc for the purpose of stimulating their own industries.

One of the first measures agreed upon among country members of the Andean Group, in addition to the "common rule of treatment for foreign investment and on trademarks, patents, licenses, and royalties (Decision 24), was the assignment of industrial sectors to each country member, giving consideration to geographic position, grade of existing technology, availabilities of raw materials, etc.

The first of these assignments was made through Decision 57, which referred to the metalworking sector. In connection with materials handling equipment and systems, lifts, hoists, elevators, pulley tackles, and winches and capstans were assigned to Peru, while the rest of the countries, including Colombia, were chosen for the production of other types of metalworking goods.

Country members can immediately start the production of assigned products and then trade them among Andean Group countries with minimum tariff requirements and duties, since it was established that in a term of up to 7 years there will be no customs duties among country members of the Andean Group.

The Ministry of Economic Development in December 1972, issued Decree 2248, which established the new Statute on Government Purchases. This "Buy Colombian" Decree permits local firms competing in international tenders to import duty-free primary and intermediate goods, provided they are not valued at more than 50% of the c.i.f. value of imported finished goods. We expect, as a result of this statute, that there will be more assembling in Colombia of products with a high labor cost component, given the low Colombian wage structure.

Malaysia

Continued rapid industrialization is spurring the growth of the Malaysian market for materials handling equipment. The need to expand and improve present transportation facilities to meet increasing requirements generated by the development of various sectors of the economy should result in further market gains.

Malaysia is dependent on overseas suppliers for approximately 85% of its annual requirements of materials handling equipment, importing $14 million worth in 1972 (West Malaysia only). Local traders state such imports are likely to grow by 6-8% annually during the next 3 years. Recent East Malaysian import statistics are not available, but could be significant in view of the increased pace of development in the States of Sabah and Sarawak. In 1970, the latest year for which published data are available, imports of materials handling equipment by Sabah and Sarawak totaled $3.1 million.

Malaysia offers limited market potential for advanced materials handling equipment and systems. It has not yet reached the stage where there is complete automation in its industries. The trend is presently toward creating more jobs, and the use of automated equipment invariably would affect employment opportunities. Unemployment in Malaysia reached 8% in 1972. Furthermore, most manufacturing plants are labor intensive and function on a small scale because of the limited domestic market (11.5 million population). Another important factor is the lack of skills to service such equipment. Some sophisticated equipment is in use in Malaysia, but this is confined only to certain processes—mainly in the food industry.

Statistical Analysis

West Malaysia's apparent consumption of materials handling equipment in 1972 amounted to $14.6 million, including an estimated $2.1 million (15% of total imports) of local production. The category of lifting, loading and conveying machines constituted about 42% of total imports, followed by parts and accessories, 32%, and industrial vehicles, 26%. The exports of such items in 1972 amounted to $1.4 million.

Japan continued to be Malaysia's leading supplier in 1972, accounting for 38.1% of total imports. The next principal source was the United Kingdom with 30.2%. The U.S. share of the market in 1972 averaged 2.8%. Although Japan and the United Kingdom are the predominant suppliers, it should be noted that Malaysia's imports from these two countries probably conceal a sizable volume of sales from subsidiaries and licensees of major American firms, including Yale, Hyster, Mack and others.

Demand Factors

Local trade sources report that equipment which offers promising import opportunities includes: forklift trucks (6,000 lbs, capacity), cranes, conveyors and components, straddle carriers, and vibrating feeders.

Specific demands for materials handling equipment are directly related to current economic developments in Malaysia. A number of these are described in the "End-User Market Analysis" which follows.

End-User Market Analysis

Malaysia's gross national product (GNP) at current prices in 1972 reached $5.16 billion, which is 6.1% higher than the level of $4.87 billion achieved in 1971. With a population of 11.5 million, the per capita GNP works out to $450. The GNP is forecast to grow 8-9% in 1973. Measured in terms of gross domestic product (GDP) estimated at $4.54 billion, at factor cost in 1972, the primary economic sector (agriculture, forestry and fishing) accounts for 35.2%, the secondary sector (manufacturing) 18.9%, and the tertiary sector (transportation, nonagricultural and nonmanufacturing sectors) 4.5%. Consumption of materials handling equipment by sectors is estimated at: the tertiary sector 40%; the secondary sector 35%; and the primary sector 25%.

Tertiary Market Sector

Malaysian ports are the largest users of materials handling equipment. The principal ports are Kelang and Penang (West Malaysia); Kota Kinabalu, Sandakan, Kuching and Sibu (East Malaysia). Other ports which are playing significant roles in the economy include Malacca, Kuantan, and Port Dickson. A new port will soon be ready in Johore Bahru.

West Malaysian ports loaded 5.9 million tons and discharged 8.1 million tons of cargo in 1972. The main items loaded were general cargo, timber, rubber, and palm oil. The principal goods discharged were petroleum products, general cargo, iron and steel bars and sheets, sugar, and fertilizers.

Statistics for East Malaysian ports are available for the year 1970 only. During that year, ports in Sabah loaded 4.9 million tons and discharged almost 1 million tons.

Several ports in Malaysia are being expanded and improved to cope with the increasing tonnage resulting from economic development. With a growing production of primary products and a larger volume of imports, the strain on existing port facilities has been critical. Under the 2nd Malaysia Economic Development Plan, 1971-75, the government is scheduled to spend some $92 million on the construction of new ports and improvement of existing port facilities.

Port Kelang, Malaysia's chief port, is by far the greatest end-user of materials handling equipment. Operated by the Port Kelang Authority, it is situated some 27 miles from the federal capital of Kuala Lumpur, with which it is connected by rail and a 4-lane highway. The port is being developed into the main logistical base for the nation's expanding export trade. Revolutionary new projects are being put into operation or are planned for the port to cope with the demanding role it is expected to play in the years ahead. Work on the extension of 2,800 feet of wharves at the North Port, started in July 1969, is nearing completion. When operative, the extended wharves will accommodate five conventional vessels at a time. Two container cranes will be installed on these wharves to handle I.S.O. standard 8′ x 8′ x 20′, 20-ton containers. A 30-acre container yard equipped with mechanized handling equipment will be constructed behind the wharves. Tenders were recently called for the supply of such equipment, including two gantry cranes, each with 35-ton capacity; eight straddle carriers of 30-ton capacity each; 10 prime movers, and 30 crate trailers. Two more container cranes and other ancillary equipment will be ordered in 1975. In addition, a container freight station will be built. Total cost of the project, including purchase of materials handling equipment, is estimated at $30 million. Concurrently, a 550-foot wharf at the South Port, designed to provide increased facilities for the export of liquid cargo, is under construction. These facilities will involve an estimated expenditure of $3.6 million. The total development expenditure for Port Kelang during the Five Year Plan period is approximately $48 million. Dutch, German and Japanese interests have been predominant in port construction up to this time.

Progress at Port Kelang may best be appraised by its activities during the past 2 years. The port in 1972 loaded 3 million tons and discharged 2.3 million tons of cargo as against 2.4 million tons loaded and 2.1 million tons discharged in 1971. The Port Authority estimates cargo tonnage to increase by 20% annually during the coming years.

The following is an inventory of Port Kelang's materials handling equipment as of 1971:

South Port: Two 5-ton portal cranes, six 2-ton portal cranes, eight ½-ton low-carriage cranes, one 25-ton mobile crane, one 12-ton mobile crane, one 10-ton mobile crane, two 10-ton gantry cranes, one 5-ton gantry crane, 20 8-ton Bedford prime movers, 100 8-ton semi-trailers, 12 6,000-lb. capacity forklift trucks, 17 6-ton scammel heads, 76 6-ton scammel trailers.

North Port: One 5-ton crane, six 10-ton cranes, one 30-ton crane, 113 2-ton forklift trucks, 19 35-ton tractors, 12 20-ton trailers, 94 10-ton trailers, 30 3-ton trailers, two 10-ton side-loaders, two 6-ton Toyota FD 60, one conveyor for discharge of bulk sugar.

Secondary Market Sector

The manufacturing sector in Malaysia consists mainly of industries producing consumer and intermediate goods and using local and imported raw materials. However, in recent years there has been a break-through in industrialization to diversify the economy. Ambitious projects such as automobile assembly and an integrated steel industry have been established, with others being implemented. The Federal Industrial Development Authority (FIDA), a statutory body charged with the responsibility for promoting and coordinating industrial development in the country, received 413 applications to set up a variety of industries in 1972, and out of these 355 manufacturing projects were given approval. These projects represent a total proposed called-up capital of $143 million and have potential for creating 56,490 new jobs. The 355 approvals, in terms of number of approved projects, show an increase of 16.4% over 1971.

The Investment Incentives Act of 1968 offers industrial investors, both foreign and local, a coordinated set of tax exemptions and tariff protection. To date, Malaysia has attracted investors from 28 countries, including the United States, with a total investment of $161 million. The United States accounted for $24.7 million. The leading country is Singapore, with $46 million, followed by United Kingdom ($34 million) and Japan ($19 million).

The success of Malaysia's industrialization program may be seen from the National Account, which shows that manufacturing output rose 12% from 1971 to $660 million in 1972. Manufacturing also increased its share of the GNP from 11% in 1967 to 15% in 1972. Rapid expansion has transformed the manufacturing sector into the second largest sector in the economy, surpassed only by agriculture, forestry and fishing. The value added by manufacturing is targeted to grow from $447 million in 1970 to $805 million in 1975. To reach this target, it is estimated that a total investment of $740 million will be required over the Plan period.

According to the 1972 Index of Manufacturing Production for West Malaysia (1968 = 100), the textile industry recorded the highest annual growth rate—26%. The wood products industry registered a growth rate of 22%, followed by the metal products industry, which increased by 21%. In the rubber products industry, a moderate growth rate of 5.5% was recorded in the output. However, this industry is expected to develop more rapidly in the next few years in view of the government's efforts to promote a diversified rubber-based industry. During 1972, output in the chemical products industry rose by 18%, with the output of chemical fertilizers for oil palm oil estates registering the highest increase. Production of compressed liquefied gases, soaps, cleaning compounds, paints, industrial chemicals and cosmetics also registered high annual growth.

Output in the transport equipment industry declined by 10%, due primarily to a sizable reduction in the production of commercial vehicles owing to uncertain market demand. The output for the year totalled 6,026 units, while production of passenger cars rose by nearly 5% to 24,775 units.

In terms of employment, the secondary sector generated substantial job opportunities, which were estimated to have increased by 7.5% to 270,000, accounting for 9% of total employment of 3.160 million in 1972. The potential long-run growth of manufacturing should portend greater consumption of a wide range of materials handling equipment.

Primary Market Sector

The agricultural sector occupies a dominant position in the Malaysian economy. It constitutes 25% of total production and employs about 40% of the labor force. In 1972, as measured by the production index of 12 commodities (namely rubber, rice, sawn logs, sawn timber, palm oil kernel, coconut oil, copra, pepper, pineapple, tea and fish), agricultural production rose by 4.2%, as compared with 7.1% in 1971. Rubber production, which is still the most important single activity in the economy, both in terms of exports (27% of total foreign exchange earnings) and employment (26% of total labor force) in 1972, dropped marginally from 1,324,500 tons in 1971 to 1,323,000 tons in 1972. However, it was expected to bounce back in 1973 with the recovery of economic activity in industrialized countries.

The timber industry, a major user of gantry cranes, forklift trucks and other lifting equipment, expanded vigorously in 1972. During that year, production of sawn logs increased by 9.1% to 16,290,000 cubic meters and lumber output grew by 18.7% to 3,266,800 cubic meters. Presently, there are 487 sawmills and 31 plywood and veneer mills in West Malaysia. With the government's policy directed toward encouraging integrated timber-based industries to provide more employment opportunities and to increase the value added of exports from the timber industry, the outlook for higher consumption of materials handling equipment appears favorable.

The palm oil industry uses pneumatic conveyors, hydraulic floor-mounted trucks, forklift trucks, cranes and trailers. The growth in this industry should stimulate consumption. In 1972, production of palm oil rose by 24.1% to 730,900 tons. Investment in this sector continued unabated, resulting in an increase of 59,100 hectares to 427,300 hectares of oil palm at the end of 1972. By 1975, the total area under oil palm cultivation in Malaysia should reach 620,100 hectares [1] with a projected output of 1,381,000 tons. This would enable Malaysia to maintain its position as the world's largest producer and exporter of palm oil.

The pineapple industry is relatively extensive. In 1972 it yielded 302,100 tons from a total planted area of about 45,000 hectares. At the same time, the production of canned pineapple reached 52,000 tons. To improve its viability, the pineapple industry will benefit from a replanting grant of $5 million to be spread over a period of 7 years. This replanting scheme is administered by the Malaysian Pineapple Industry Board. A strong pineapple industry will provide impetus for sales of conveying machines, tractors, trailers and other related equipment.

Another important user of lifting, loading and conveying equipment is the sugar industry. The area under sugarcane cultivation amounted to 13,000 hectares in 1972, compared with 9,000 hectares in 1971. The government plans to establish over 100,000 acres by 1977 to replace present imports. There are now four integrated sugar projects in various stages of development. When in full production by 1975, they are expected to have a total planted area of 38,500 hectares capable of producing 270,000 tons of refined sugar per year.

Domestic Materials Handling Equipment Industry

Local production of materials handling equipment is confined principally to items which enjoy a sufficiently high domestic demand and which can be manufactured with little capital outlay and technical know-how. The lack of supporting ancillary industries for the manufacture and supply of major components and parts requiring rigid tolerance and quality control will likely deter local production of expensive and advanced materials handling equipment and systems. Among the principal materials handling equipment produced in Malaysia are cranes, hoists, conveyors and hand trucks.

Market Development Data

The primary method of distribution is from manufacturer to importer, who markets directly to end-users. Most of these importers are equipped with service and repair facilities supported by a network of sales offices throughout the country. The common practice in Malaysia is to grant exclusive distributor-

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[1] hectare = 2.47 acres

Table 1.—West Malaysia's Imports of Materials Handling Equipment—1972

SITC Code	*Product Description*	*Total Imports* U.S.$ (c.i.f.)	*Major Suppliers*	*Share of Imports* U.S.$ (c.i.f.)
629401	Flat Transmission Belts Of Vulcanized Rubber	151,200	United Kingdom	75,200
			Japan	38,600
			United States	3,100
629402	V Type Transmission Belts Of Vulcanized Rubber	490,900	Japan	157,200
			United Kingdom	126,500
			United States	41,200
629403	Conveyor Belts Of Vulcanized Rubber	148,400	United Kingdom	61,100
			Japan	40,500
			United States	9,500
655921	Transmission Belting, Etc., Of Camel Hair	26,900	United Kingdom	26,600
			Denmark	300
			United States	—
655929	Transmission Belting, Etc., Of Other Textile Material	120,300	United Kingdom	29,000
			Japan	25,800
			United States	1,600
719311	Other Lifting Machinery	1,639,700	Japan	907,500
			United Kingdom	133,000
			United States	5,500
719312	Jacks & Pulley Tackles	274,700	Japan	102,300
			United Kingdom	89,100
			United States	17,600
719313	Other Machinery For Loading, Lifting, Etc.	4,237,300	Japan	1,761,100
			United Kingdom	1,021,100
			United States	54,700
719319	Parts For Loading Machinery	2,276,800	United Kingdom	819,900
			Japan	246,900
			United States	24,000
719321	Tractor & Truck Fork-Lift Of Squeeze-Clamp Lift	2,437,800	Japan	1,886,800
			United Kingdom	450,500
			United States	32,100
719327	Parts For Other Industrial Work Trucks N.E.S.	209,700	United Kingdom	85,400
			United States	82,700
			Japan	16,500
719328	Parts For Fork-Lift, Etc., For Tractors & Trucks	269,800	Japan	135,400
			United States	62,400
			United Kingdom	58,600
719329	Other Industrial Work Trucks	646,000	United Kingdom	429,100
			Australia	54,700
			United States	41,300
733301	Other Goods, Vehicles, EG., Truck, Trolley, Etc., Not Motorized	146,200	United Kingdom	95,400
			Japan	19,400
			United States	4,900
733302	Trailers For Motor Road Vehicles	27,200	Canada	6,500
			West Germany	4,100
			United States	1,300
733308	Other Road Vehicles Not Motorized	42,900	United States	16,200
			United Kingdom	9,400
			Singapore	6,900
733309	Parts For Road Vehicles Not Motorized	814,500	United Kingdom	723,900
			West Germany	43,100
			United States	800

Grand Total	14,000,000	
Japan	5,338,100	38.1%
United Kingdom	4,233,700	30.2%
United States	398,900	2.8%

ship for the entire country, often including Singapore because of its close proximity.

The Malaysian market is predominantly price conscious, which accounts for the fact that Japanese suppliers successfully made inroads into the market in 1972, replacing the United Kingdom, Malaysia's traditional leading supplier. U.S. materials handling equipment generally has been higher priced. However, with the recent revaluations of the Japanese yen and European currencies, coupled with the second U.S. currency realignment within 14 months in February 1973, the competitive position of U.S. suppliers has strengthened. An increasing number of Malaysian importers already are showing interest in locating possible sources of supply in the United States and, given prompt initiative, U.S. exporters should be able to capture a larger share of the Malaysian market for materials handling equipment.

Most Malaysian importers require c.i.f. quotations. The terms of payment for imports are usually by letter of credit, often with 60-90 day drafts. The distributor's mark-up on c.i.f. prices is between 20-25%. Prices from distributors to end-users are quoted at list price less a trade discount of 5-10%. Most transactions for materials handling equipment are conducted on cash terms varying from 30 to 60 days, and payment is often delayed beyond the duration of the officially stated credit period allowed. Some distributors offer a special discount for payment within a stipulated time from the date of invoice and some impose an interest charge of 1-2% for late payment. Purchasers of new equipment are given 6 months to a year warranty, with cost of labor borne by the distributors. The manufacturers usually reimburse distributors for warranted parts.

There is little sales promotional activity on materials handling equipment. Most of the importers rely on personal selling efforts of their sales staff, aided by direct mail campaigns. The more enterprising companies advertise occasionally in newspapers. A great number of them have their products listed in the Yellow Pages and advertised in trade magazines such as *Asian Trade & Industry, Malaysia Trade & Industry* and *Malaysia Business*. Many of them also have advertisements inserted in journals published by the various port authorities.

Trade Regulations

Malaysia's import regulations and procedures are moderate, reflecting its policy of facilitating the importation of essential capital goods and materials. Materials handling equipment not manufactured locally may be imported into the country free of restrictions and import duties. However, such equipment is subject to the general 4% surtax and 5% sales tax.

Technical Requirements

Malaysia imposes no specific packaging or labeling requirements on imported equipment. The Standards Institute of Malaysia (SIM), a government agency, is responsible for setting up standards and is presently preparing national standards for particular indutries. Pending their completion, British Standards are generally adhered to. The British systems of weights and measures are in use, but conversion to the metric systems is to be completed by 1981. The safety codes for the use of machinery are governed by the Factories and Machinery Act, 1967.

Electric current in Malaysia for the most part is supplied at 50 hertz, 240/415 volts, 1 and 3 phases, 2 and 4 wires.

Nigeria

The average annual value of imports of materials handling equipment into Nigeria over the last 3 years was $9.4 million. The U.S. share of the market averaged 29%, or $2.8 million per year.

Lifting, loading and conveying equipment, which chiefly includes conveyors, cranes and hoists, is the category of materials handling equipment with the largest volume of imports (70% of the total, or an annual average of $6.3 million in the 1970-72 period). Sales in this category of equipment, in which the average annual U.S. share was 43% in 1970-72, are expected to rise 15% a year over the next 3 years, in line with the high level of growth in Nigerian industrial production and spending.

Industrial vehicles, which include forklift trucks and integral tractor-shovel loaders, is the category of equipment making up the balance of the imports (30%, or an annual average of $3.1 million in 1970-72). Sales of this latter category, in which the U.S. share averaged 12% in 1970-72, are projected to increase 8% a year, based on the best estimates in the materials handling trade.

The equipment items with the highest sales potential are belt, bucket, chain and roller conveyors, which could be introduced for the first time into the ports and at major agricultural produce centers; the industrial demand for conveyors also should grow substantially. There is a good sales potential for cranes, hoists, integral tractor-shovel loaders, and floor trucks as a result of the continued boom in industrial production and market distribution development. The opportunities for advanced material handling equipment or systems are limited, however, because of the low level of local technology.

Market promotion in Nigeria favors established equipment distributors/agents with facilities and staff to reach an end-user universe of some 500 establishments. Such firms must have the capital to stock parts and the personnel to offer maintenance and service. Companies wishing to enter the market find it difficult to secure well qualified organizations not already committed to represent competing lines.

Demand Factors

Lifting, loading and conveying equipment is the category of materials handling equipment which has the predominant volume of business and the most dynamic growth potential. Sales have been moving upward with the increased level of activities in the manufacturing sector. Boom conditions have been evident in cement and aggregates, which require conveyors and other handling equipment. Three new cement factories are planned in areas near Ilorin, Sokoto and Maiduguri; plant extensions are also expected to be made to existing cement factories. Aggregate producers tend to buy portable conveyors as a package with crushers; there should be a good replacement market for conveyors and belting, which generally have a 2-year life. Lifting, loading and conveying equipment will be required at the new Apapa Truck Terminal planned for 1973.

The market demand for industrial vehicles has remained relatively steady. The integral tractor-shovel loader holds about 80% of the industrial vehicle volume; forklift trucks hold about 20%; the market for specially modified integral tractor-shovel loaders or modified agricultural tractors is somewhat limited. The trade in general has effectively anticipated the market with aggressive sales programs. The brewery and soft drink bottlers ordered record amounts of new plant equipment in the past year to cope with increased market demands; the bottlers should be leading buyers for forklift trucks and other materials handling equipment.

Sales Potential

Belt, bucket, chain and roller conveyors offer the highest sales potential. There appear to be major opportunities for the introduction of conveyors in the private industry sector, in the ports and at major agricultural produce centers. Few local firms market this type of equipment.

The following products offer a good sales potential:

Cranes.—This aggressive, active market is well covered. Cranes and parts have represented over 50% of U.S. sales in the lifting, loading and conveying equipment category. Nigeria has in operation about 100 cranes of 5 tons and above; 5 to 10 such cranes are imported each year.

Hoists.—There are not too many makes in the market. Hoists have made up about 25% of U.S. sales in the lifting, loading and conveying equipment category.

Integral tractor-shovel loaders.—Such equipment has made up 80% of U.S. sales in the industrial vehicle category. Nigeria has 40 to 50 units in use.

Forklift trucks and floor trucks.—Good sales potential. Nigeria has approximately 700 forklifts in operation; replacements and new business should be almost 125 units a year, based on an average life in Nigeria of 6 years. The port authorities use 8,000-lb. units and industrial users 6,000-lb. units.

Market Sectors

Lifting, loading, and conveying equipment.—There are approximately 300 establishments that are potential customers for conveyors, cranes and hoists; these organizations each employ 100 to 1,000 employees. These include approximately 100 small- and medium-size workshops in fabricated and structural metal products; 100 textile mills and producers of made-up textile goods; several dozen quarries handling an average of 50 tons of aggregate an hour; seven cement factories; the port authorities of Lagos, Port Harcourt, and six minor ports; and several dozen major peanut, cocoa, palm kernel and cotton produce buying and warehousing centers.

Industrial vehicles.—There are about 500 establishments that are potential customers. These organizations, each of which has 100 to 1,000 employees, include most of the potential customers for lifting, loading and conveying equipment; a large portion of these firms are wholesalers and retailers with warehousing operations.

Future Trends

The sector growth rate for lifting, loading and conveying equipment can be expected to rise 15% a year over the next 3 years in line with the level of growth in industrial production and capital spending. The Central Bank of Nigeria's index of all manufacturing industries for 1972 rose 17% over the previous year; the cement industry index in the same period was up 66%.

The sector growth rate for industrial vehicles is expected to rise 8% a year over the next 3 years. Trade sources see a promising potential for integral tractor-shovel loaders and forklifts but anticipate that the sales growth rate will be about one-half the rate for other categories of material handling equipment.

The small and medium size of most industrial establishments, coupled with the low level of local technology, does not favor much near-term opportunity in advanced materials handling equipment or systems.

End-User Establishments

The major establishment in lifting, loading and conveying equipment is the Nigerian Ports Authority (NPA). It is located in the Ports Authority Building, Marina, Lagos, and administers the ports of Lagos/Apapa, Port Harcourt and six minor ports.

The port of Lagos/Apapa has 42 portal cranes (all Stothert and Pitt, U.K.) with a maximum crane capacity of 5 tons. In general, ship cranes are used more often than shore cranes for loading and unloading. The port also has some 6 mobile cranes which are largely out of service; an additional 3 cranes are leased to companies in the private sector. There are two 20,000-lb. forklifts for container handling (one from Henley Forklift, U.K. and one from Shelvoks and Drewry), and 250 forklifts,[1] of which 90% are 8,000-lb. units. A number of the newer units are electrically operated. In addition, there are about 100 privately owned forklifts in the port operated by shipping and forwarding firms. Elder Dempster Lines, for example, has five of its own and 35 on call.

There also are two belt conveyors (portable, used for cocoa), several very old chute conveyors, and one double-armed vacuum lifting unit for wheat. The port has no hoists. It is estimated that there are about 100 floor trucks in the Lagos/Apapa port.

Maintenance of equipment has been very poor in the Lagos/Apapa port area, where all maintenance of Nigeria Ports Authority equipment is handled by NPA workshop crews. Many cranes and forklifts, including new units, are often out of service because they have not been properly maintained. Up to 60% of all forklifts are sometimes out of order. Many stevedoring companies and shipping lines operate their own forklift and repair shops, at extra expense, to assure availability of reliable handling equipment.

NPA in February 1973 ordered some 108 forklifts, valued at $4.5 to $5.1 million, from a U.K. manufacturer.

NPA has a World Bank credit of up to $30 million for the expansion of Lagos/Apapa port and the purchase of equipment and technical service. At least one-half of the sum is expected to be expended for the Lagos/Apapa port, the major port of Nigeria. It has the bulk of NPA's cranes and forklifts and other materials handling equipment.

The major establishment in the industrial vehicle sector is Nigerian Breweries Limited, 1 Abebe Village Road, Iganmu, P.O. Box 545, Lagos. It is the largest brewery company in Nigeria, employing 500 to 1,000 workers. The company has a branch brewery plant of similar size in Aba, East-Central State, and a slightly smaller plant in Kaduna. Nigerian Breweries also has a soft drink bottling plant at 251 Apapa Road, P.O. Box 545, Apapa, Lagos, which employs 200 to 500 employees.

The Lagos brewery has 12 to 15 forklifts of 6,000-lb. capacity. The plant operates 3 special bottle conveyors and 3 case conveyors (roller). Two bottle and two case conveyors are also operated at both the Aba and Kaduna plants.

The firm, which has experienced a boom in sales, purchased new bottling machinery in the last year. Once the new capacity is installed, the company can be expected to be in the market for additional materials handling equipment.

Domestic MHE Industry

There is only one known manufacturer of materials handling equipment in Nigeria. Witt and Busch

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[1] There are an estimated 329 forklifts in all NPA ports; about 75% reportedly are in the Lagos/Apapa port area.

Table 1.—Nigerian Imports of Materials Handling Equipment
(In thousands of U.S. dollars)

	1970	*1971*	*1972*	*Forecast 1973*	*Forecast 1974*
Forklift trucks and other industrial trucks	2,307.2	4,902.8	2,064.2	3,300	3,900
Lifts	742.0	1,047.2	787.4	1,000	1,300
Freight hoists, conveyors, cranes, etc., and parts for mechanical handling equipment	4,104.8	6,370.0	5,736.5	6,200	7,300

* Actual imports are based on published and unpublished statistics of the Nigerian Federal Office of Statistics, Lagos. Nigerian production exports of materials handling equipment are negligible in value. See note at end of table 2.

Table 2.—Nigerian Imports of Materials Handling Equipment by Country Origin
(In thousands of dollars)

Source	*1971*	*1972*	*Forecast 1973*	*Forecast 1975*
Forklift trucks and other industrial vehicles				
United States	439.6	264.5	495	780
	(9.0%)	(12.8%)	(15.0%)	(20.0%)
United Kingdom	2,108.4	1,036.6		
France	596.4	—*		
Japan	—*	173.3		
All others	1,758.4	589.8		
Lifts				
United States	47.6	15.2	150	200
	(4.5%)	(1.9%)	(15.0%)	(15.0%)
United Kingdom	758.8	480.3		
Italy	*	127.7		
West Germany	98.0	*		
All others	142.8	164.2		
Freight hoists, conveyors, cranes, etc., and parts for mechanical handling equipment				
United States	3,256.4	1,313.3	3,100	4,400
	(51.1%)	(22.9%)	(50.0%)	(60.0%)
United Kingdom	2,055.2	2,140.2		
West Germany	364.0	647.5		
All others	694.4	1,635.5		

* Imports in given years are shown only for two leading supplier countries other than the United States.
Note: The abridged product descriptions and data in Tables 1 and 2 cover Nigerian classifications 71932, 71933 and 71939.

(Shipyard) Ltd., Port Harcourt, a sister firm of Witt and Busch Ltd., Apapa Road, P.O. Box 17, Lagos, has recently started partial local assembly of gantry cranes. The shipyard reportedly is the largest private shipyard in the country. The prospects appear poor for any significant production of forklift trucks, cranes, hoists or conveyors in Nigeria in the next 3 years.

Market Development Data

The market favors distributors/agents with facilities and staff to reach a large number of end-users, and those with technical service and parts capabilities. U.S. manufacturers having an established position with Nigerian distributors can be expected to hold or increase their share of the market. Those U.S. firms not now in the market will find it difficult to find technically competent distributors who are not already committed to competing lines. There is generally little new agency interest among the well established British, French, German and Dutch trading firms which handle much of the materials handling business; these companies are adjusting the scope of their operations to the Nigerian indigenization decree, which will closely control and limit their future activities in the wholesale and distribution trade. The foreign organizations are thus now trimming the range of their representations and retaining mainly the more profitable lines. Therefore, American firms new to market should primarily seek out indigenous Nigerian companies that over the long term will be taking over an increasing part of the trade.

With effort and perseverance, qualified Nigerian agents can be located. American firms with new representatives should assist in the initial sales and promotion efforts however. Most Nigerian firms would benefit in the formative period by having key staff oriented and trained in the United States or by being supplied with training personnel for a well-developed guidance program in Nigeria. The Nigerians should be helped in establishing maintenance and service capabilities. U.S. manufacturers/suppliers prepared to enter into joint ventures or participation arrangements should be particularly favored.

There is general recognition in the market that liberal finance is necessary to support new Nigerian distributors, many of whom lack working capital. If U.S. manufacturers and suppliers wish to succeed in this booming market they should be prepared to finance their distributors with demonstrators and consignment merchandise. It is extremely difficult to interest buyers from catalogs; the Nigerian customer must be able to see working equipment.

End-users of forklift trucks, specially modified integral tractor-shovel loaders, and other materials handling equipment express a dislike for units which are assembled from several or more places of origin. They prefer to deal with distributors or manufacturers who can furnish the full range of spare parts from one location. Front-end loaders are generally produced by one overseas manufacturer.

Regulations

There are no no-tariff barriers to the importation of materials handling equipment and systems. Nigeria maintains a single-column, non-preferential import tariff schedule which applies to imports from all countries, including the United States.

The realignment in values of currencies which has taken place since May 1971 should give price advantages to U.S.-produced forklift trucks, cranes and hoists. Considerable erosion is expected to occur in Japanese sales of Toyota forklifts (a market leader), and in German and French makes of cranes and hoists.

Peru

Peruvian production of materials handling equipment is confined principally to various kinds of conveyors, winches, pulley tackles and hoists. The production of forklifts, front-end loaders and other similar powered equipment is not imminent.

Peru will continue to depend on foreign suppliers for powered trucks, floor trucks and specialized and automated lifting and loading equipment. Imports of these items are expected to increase notably within the next few years, principally from the United States.

The United States will probably maintain its leadership in the supply of materials handling equipment to Peru because principal end-users have installations and equipment built to U.S. technical standards and specifications, and because U.S. products and equipment enjoy a preference for their higher quality and performance.

The fishing and manufacturing industries are the markets offering the highest sales potential for domestic and imported materials handling equipment.

Traders and manufacturers have pointed out that U.S. suppliers will continue to be at a disadvantage in the Peruvian market until they can eliminate three negative factors which now obtain in U.S. commercial dealings with this country: (1) credit terms' restrictions, (2) limited financing on large orders, and (3) delays in the delivery of orders. Except for the import prohibition on several locally manufactured items, there is no barrier to the importation into Peru of materials handling equipment and systems.

Statistical Analysis

Official 1970 data (the latest available) on production of materials handling equipment is given, together with estimates for the years 1971 through 1975, in Table 1.

Peru manufactures the following materials handling equipment: (1) conveyors, chiefly screw conveyors, belt conveyors and bucket conveyors and winches; (2) pulley tackles and hoists, both electric and non-electric; (3) cranes; and (4) hydraulic elevators, cargo elevators, and special elevators. These items are manufactured to order exclusively and manufacturers do not carry stocks. There is no production of materials handling systems or of powered conveyor trucks and elevating stacking trucks.

Imports into Peru of all kinds of materials handling equipment and systems (MHE&S) under SITC 719.31 and 719.32 (Peruvian Tariff Positions Nos. 84.22 and 87.07) in thousands of U.S. dollars for the years 1970, 1971 and 1972, as well as forecasts for 1973 and 1975 for major items, appear in Table 1.

Demand Factors

Although a substantial rise in production of materials handling equipment is expected within the next few years, the demand for advanced and specialized lifting, loading and conveying equipment, as well as powered vehicles such as cranes, forklifts, floor trucks, front-end and side loaders and systems, will provide an expanding market for imported equipment and systems, principally from the United States.

Peru currently manufactures only a limited number of product lines in the materials handling category, hence there is still a demand for imports of related but more sophisticated equipment. Domestic products include conveyors, winches, pulley tackles, and hoists. Other factors favoring U.S. export potential to Peru of products in this industry segment are the increasing needs of end-users, principally the fishing industry, and the ready availability of U.S. equipment and parts. Demand for United States equipment and systems will continue to grow because the majority of consuming industries operate installations, machinery and equipment utilizing U.S. technology and also because U.S. products enjoy an excellent reputation for quality. Government entities, particularly those charged with the control and maintenance of seaports and airports, also prefer U.S. equipment because it is more advanced and specialized. Many government entities, which are important users of the above equipment, reportedly have staffs of engineers and technicians of whom a significant proportion were trained in the United States.

Sales Potential

Powered trucks such as forklifts and cranes have the highest sales potential, according to one U.S. representative who handles the foregoing equipment. He suggests that it will be years before the local industry can build this equipment in quanities sufficient to meet the expected growth in all industrial activities. Thus far, only one British firm[1] has announced that it is contemplating the manufacture of powered front-end and side-loaders of from 2 to 15 metric tons by the end of 1975.

Industry sources believe heavy duty hoists, derricks, vacuum lifting equipment, hydraulic jacks, and highly specialized conveyors, probably automated, have a good sales potential in the Peruvian market. None of these items are manufactured in

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[1] Lancer-Boss Ltd., London.

Peru at present, and their future manufacture is somewhat doubtful. Current developments in the fishing, shipbuilding and metalworking industries suggest there will be a good sales potential for the above equipment.

End-User Market Analysis

The principal sector using materials handling equipment is the fishmeal industry. This industry, which has just been expropriated by the Peruvian Government, comprises 105 fish meal plants and a fleet of 1,486 fishing boats, and employs over 27,000 persons, including fishermen, wharf and factory personnel, and administrative and technical staff.

The fishing industry is undergoing a severe crisis at present due to abnormal climatic conditions, which have caused the disappearance of the anchovy, the basic element in the production of fishmeal. Since the crisis in the fishmeal industry is believed to be temporary and cyclical, it is possible that within 6 or 8 months the industry will recover to a substantial degree. Government officials assert that the fishmeal industry, as a state monopoly, will become strong and financially sound.

Because the Peruvian Government aims to strengthen the fishmeal industry by improving the efficiency of its various operations, it may be assumed that utilization of advanced materials handling equipment and systems will be contemplated in the Ministry of Fisheries' plans.

The fishing sector accounts for nearly 60% of conveyors and 50% of winches, pulley tackles and hoists and hydraulic elevators of local manufacture, while its import share of similar equipment is estimated at around 30% and 40%, respectively.

The manufacturing industries constitute another important sector. They comprise some 6,000 establishments and employ over 200,000 persons. This sector accounted for 52.3 billion soles of the total of the Peruvian Gross Domestic Product of ps/ .250.1 billion recorded for 1971. The principal industries of this group are food processing, alcoholic and nonalcoholic beverages, textiles, chemical products, metalworking, printing and transportation. The demand-induced expansion now underway in all these industries will require greater utilization of advanced materials handling equipment and systems by this sector.

The manufacturing industries sector accounts for about 25% of all locally manufactured conveyors, pulley tackles and hoists, and for 30-35% of imports into Peru of specialized conveyors, cranes, hoists, forklifts, front-end loaders, and other cargo elevators.

End-User Establishments

Pesca Peru, the Peruvian Government agency charged with the production of fishmeal and fishoil, is the largest end-user of materials handling equipment in the fishing sector. Pesca Peru was created by means of the expropriation of all private sector fishmeal industry assets on May 7, 1973, and has an authorized capital of S/5 billion ($129 million) fully subscribed by the Peruvian Government.

Industry sources say that Pesca Peru has a substantial amount of new and modern equipment, including materials handling equipment, and anticipate that the new administration of the fishmeal industry is contemplating the acquisition of advanced or automated equipment, including MHE&S, with a view to having its production operations performed efficiently and economically.

A major domestic manufacturer is MORAVECO S.A., located at Guillermo Dansey 1171 (P.O. Box 5576), Lima. Moraveco is the leading manufacturer of metal furniture, household refrigerators, gas and electrical stoves, washing machines, gas cylinders truck bodies and automobile parts and accessories for the local automobile assembling plants. It also assembles passenger buses and its plant installations reportedly have an assembling capacity of 1,000 60-passenger buses per year. The firm's capital is $2.4 million.

The machinery and equipment presently being used by Moraveco is relatively new and modern. This is true also of its materials handling equipment, such as conveyors, hoists, pulley tackles, cranes, cargo elevators, forklift trucks, front-end and side loaders. Moraveco is presently involved in a $12-million expansion program, which will require specialized or automated materials handling equipment and systems. This manufacturing plant is the most important one in the metalworking industry and is likely to be a principal buyer of advanced and automated equipment and systems.

Domestic Materials Handling Equipment Industry

The materials handling equipment industry in Peru is still relatively undeveloped, its limited production achieved by only 12 metalworking plants of different sizes operating in the Lima-Callao area. These plants not only engage in the fabrication of materials handling equipment but also manufacture a wide variety of metal products and equipment.

The bulk of materials handling equipment manufactured in Peru consists of conveyors, chiefly screw conveyors, belt conveyors and bucket conveyors, and winches, pulley tackles and hoists, both electric and nonelectric, and parts and accessories. Other manufactured items include bridge-cranes, cargo elevators, hydraulic elevators and similar cargo handling equipment. All of the foregoing domestic equipment is made to order exclusively and is based on relatively uncomplicated Peruvian designs and specifications. Local manufacturers do not carry stocks.

Table 1.—Peru: Size of the Market for Materials Handling Equipment, 1970-75
(in thousands of U.S. dollars[1])

	1970	1971	1972	1973	1975
Total Production	979.3	1,142.7	1,477.8	1,859.4	2,529.0
Hoists	268.0	281.4	337.7	405.2	526.8
Cranes	56.9	68.3	82.0	98.4	127.9
Elevators	77.5	100.7	161.2	193.5	251.5
Mechanical Conveyors	551.4	661.7	860.2	1,118.3	1,565.6
Conveyors, all others	25.5	30.6	CF.G	44.0	57.2
Industrial Vehicles	—	—	—	—	—
Total Imports	4,464.7	4,368.2	5,099.0	3,953.0	4,410.0
Lifting, loading & Conveying Equipment	2,842.8	2,977.0	3,412.3	2,025.0	2,160.0
Cabine & Parts for above	1,106.3	900.1	871.5	900.0	1,000.0
Industrial Vehicles	444.2	423.8	745.2	928.0	1,000.0
Parts for above	71.4	67.3	70.0	100.0	150.0
Total Market Size[2]	5,444.0	5,510.9	6,576.8	5,812.4	6,939.0
United States Share	2,816.0	1,652.8	NA		
	63.1%	37.8%	NA		

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[1] US$1 = S/.38.70.

[2] Market Size equals production plus imports.

Sources: Production data for 1970 are based on reports from the Statistical Department of the Peruvian Ministry of Industry and Commerce; 1971-75 data are based on estimates of trade sources. Import data for 1970-72 based on statistics reported by the Callao Customshouse; 1973-75 data based on trade estimates.

Powered trucks such as forklifts, front-end and side-loaders, cranes, floor trucks and heavy duty powered hoists, are not manufactured locally. However, expansion and modernization plans of local manufacturers call for future production of advanced and specialized equipment of this sort, which will require licensing arrangements with foreign firms. In general, Peruvian manufacturers prefer to make licensing arrangements with U.S. companies.

The metalworking industry is at present undergoing expansion and modernization, and manufacturers anticipate a tripling of 1970 production levels (about $979.3 thousand) by 1975. Two important factors supporting this optimistic outlook are: (1) The empasis the Peruvian Government has put on the development of this industry. Decentralization plans call for the expansion of existing metalworking plants in Arequipa, in southern Peru, and the establishment of a metalworking complex in Chimbote, Peru's principal fishing port on the northern coast; (2) the assignments made to Peru by the Andean Pact for the manufacturing of pulley tackles and hoists of all kinds destined to the markets of the Andean Pact countries.

The local representatives of a British firm recently announced that their principals are presently studying the feasibility of manufacturing front-end loaders and side-loaders with 2 to 15 metric tons capacity under licensing arrangements with a Peruvian firm by the end of 1975.

Market Development Data

Peruvian end-users of materials handling equipment, principally of sophisticated powered equipment such as forklifts, front-end loaders, cranes, floor trucks and other specialized cargo handling units, have mentioned several negative factors that United States suppliers must overcome in order to achieve greater penetration of the Peruvian market. These are the principal ones: (1) credit terms' restrictions; (2) instability of prices; (3) delays in delivery of goods; (4) limited financing on large orders; (5) absence of regular exhibitions of equipment demonstrating latest improvements; (6) lack of direct contact with end-users, since local representatives' assistance is sometimes insufficient; (7) supply of equipment with gasoline engines (local preference is for machines equipped with diesel engines because of cheaper operating costs); (8) absence of visits by Spanish-speaking traveling sales personnel; (9) lack of catalogs, price lists and informative materials in the Spanish language (European competitors provide them).

Regulations

Products which are locally made and inscribed in the Peruvian Registry of Manufactures are subject to import restrictions, even prohibition, in accordance with the Peruvian Industrial Promotion Law No. 13270. There are no other barriers to the importation of materials handling equipment and systems. The importation of prohibited and restricted items is permitted however, when they originate in signatory countries of the Andean Pact and LAFTA.

The only factor restricting the volume of permitted imports, including materials handling equipment and systems, is the import quota system. Decree-Law No. 19028 of November 11, 1971 created the Peruvian Monetary Board and the foreign exchange import quota system. These Government measures were taken with a view to controlling and rationalizing the use of foreign exchange. Foreign exchange for imports is available in the form of exchange certificates at the rate of S/38.70 per US$1.00.

Peru is a member of the Latin American Free Trade Association (LAFTA), which was organized under the Treaty of Montevideo in February 1966, and of the Andean Group, which is a subregional trade association organized in May 1969. The Andean Group comprises Chile, Ecuador, Bolivia, Colombia and Peru. Venezuela joined the Group early this year. Peru is also a member of GATT.

A new Import Tariff based on the Brussels (NAB) and Andean Pact nomenclature went into effect December 31, 1972. Imports of materials handling equipment into Peru are subject to both specific and ad valorem duties. Most of the items in this product category pay specific duties of S/0.50 per gross kilogram plus 42% ad valorem taxes.

Pulley tackles, hoists and jacks pay specific duties of S/2.00 per kilo, plus advalorem duties of 42%. Parts and accessories for powered vehicles such as forklifts, front-end loaders and similar loading equipment pay specific duties of S/1.50 per kilo, plus 42% ad valorem duties.

The assembly or manufacture under license of foreign products is permitted in Peru if approval is obtained from the Ministry of Industry and Commerce.

Singapore

The market for materials handling equipment and systems (MHE&S) will continue to grow rapidly in Singapore. It will be stimulated by increasing labor costs, scarcity of land and the intense competition between companies for a market share. The use of a systems approach to materials handling is still several years off. The major impetus toward the use of sophisticated equipment will come from the large multinational firms and the Port of Singapore Authority (PSA), the largest single user of MHE&S in Singapore. The recent international currency realignments should boost U.S. sales here but have not quite placed U.S. equipment on the same price level parity as non-U.S. equipment.

Demand Factors

Demand for lifting, loading and conveying equipment has been increasing at a rate of over 30% per year since 1970. The construction boom in Singapore, particularly in high-rise office and apartment buildings, has spurred the demand for hoists, elevators and cranes. The PSA has also purchased four large quay cranes for its container port and expects to purchase two more. Construction of new drydocks by Singapore shipyards will also require heavy investment in equipment.

The greatest demand for industrial vehicles in Singapore is for forklifts, mobile cranes and straddle carriers. There also is a strong demand for small floor trucks, but in terms of dollar sales the market is small. There is a universal demand for forklifts among Singapore firms that have warehousing. Most firms view the forklift as the first—and sometimes only—step in mechanizing their materials handling.

Large mobile cranes are used by the port and by heavy industry, e.g. shipbuilding, and offshore rig construction. Straddle carriers also have a strong market in the port and other container handling operations.

The principal factors in the demand for systems and specialized equipment are the containerization of cargo handling and the large warehousing facilities of the PSA and large multinational firms in Singapore. Demand for more advanced equipment is derived in part from Singapore's desire to provide the most sophisticated services to shippers in Southeast Asia. To maintain Singapore's position as the distribution center of the region, firms there also must provide the most efficient and fastest service possible. This will eventually lead to automated warehousing, increased use of data processing equipment, and mechanical vehicle control systems.

Sales Potential

Singapore firms, in general, do not have mechanized materials handling operations. However, mechanization is increasing as labor costs rise (there is no opposition from labor unions over the use of mechanized materials handling equipment).

Also, the many regional distribution centers are turning to mechanized materials handlings operations in search of a competitive edge. The single item with the highest interest is forklift trucks. This is primarily due to the versatility which makes this vehicle a natural first purchase for firms that are mechanizing their MHE&S. All types of cranes and motor hoists are other products with high sales potential here. Pallet containers, loaders and unloaders also have a high sales potential, as they make the use of forklifts and hoists more practical.

Various types of conveyors, freight elevators, front end loaders, and hand trailers and trucks also should have good sales potential here.

Unfortunately, there is low demand for automated and integrated materials handling systems, which is the area in which U.S. manufacturers are most competitive. Most of the heavy-duty materials handling equipment used by the heavy industries in Singapore is either of Japanese or European origin. This is due to the large Japanese presence in Singapore's shipbuilding industry and the fact that government-owned operations such as the PSA are required to purchase mainly on price, which frequently eliminates U.S.-made equipment. With the recent currency realignments, U.S. goods are becoming more price competitive, and the PSA is very interested in purchasing U.S. heavy-duty forklifts for its container port. Many large construction projects, such as oil refineries, are also carried out by Japanese construction and engineering firms, another factor which stimulates sales of Japanese materials handling equipment over U.S. made goods. Singapore firms are by no means "tied" to the purchase of Japanese equipment. Where U.S. firms have made significant efforts to demonstrate the quality of their products and have developed an overall materials handling operation for the firm, they have developed good sales. Another important area where some U.S. firms have taken the initiative is in the training of the operators and good follow-up service.

Some firms in Singapore are ready for more advanced materials handling equipment and systems. The impetus for increased mechanization, however, must come from the supplier, who is in the best position to show the buyer what is available and how it will benefit him. Consulting engineers report that

Singapore companies are already showing an interest in systems although there will probably not be real sales potential for advanced equipment and systems until 1975. There is, on the other hand, a real opportunity for sales in solid waste handling equipment. The Housing Development Board (HDB), which is building 30,000 units a year, is looking for a system to partially mechanize their garbage handling. If a system could be sold to the HDB, the Ministry of Environment (responsible for collecting and transporting waste) would have to buy compatible equipment.

End-User Market Analysis

Two of the principal materials handling equipment and systems market sectors in Singapore are the cargo handling sector and the industrial warehousing and distribution firms. The various ports and the air cargo terminal are the main cargo handlers. The Port of Singapore Authority has over 10,000 employees, some 4,000 of whom are directly involved in cargo handling. The air cargo facilities at the main airport, Paya Lebar, employ approximately 250. Singapore has about 30-40 warehousing and distribution firms with over 75 employees, and there are hundreds of smaller regional and local sales and distribution centers.

Both the cargo handling facilities and warehousing and distribution centers are expanding rapidly. The projected annual increase in cargo handling by the PSA is 10% through 1980. Handling of air cargo is estimated to increase by over 30% from 1973-75. The port is undergoing major expansion in warehousing and docking berths now and will be constructing major new port areas in the next decade. The airport will be expanded greatly to meet anticipated increases in both passenger and cargo handling.

Singapore should continue to be the distribution center for Southeast Asia up to and beyond 1975. This position is due in large part to its superior cargo handling facilities, shipping services and lack of import duties, as well as its being situated on major shipping lanes. Annual growth in this area will depend greatly on external factors; i.e., the intensity of the search for oil in Southeast Asian waters and regional economic and political developments. The Singapore Government is primarily encouraging foreign manufacturers to settle here but is still receptive to large-scale distribution centers, particularly where there is a high degree of local participation in management, and training programs for the workers are provided. Growth in this area should be a minimum of 8-10% and could be considerably higher.

The cargo handling facilities, particularly the ports, use advanced materials handling equipment, but except for containerization and bulk cargoes such as oil and grains, do not have a very well developed systems approach. They are receptive to the most advanced materials handling equipment components and should continue to purchase sophisticated equipment.

Distribution centers, with the exception of some large multi-nationals, do not generally utilize advanced materials handling equipment and systems. There is a trend in that direction, however.

Estimated sector share of total MHE&S Market

	Cargo handlers	*Distribution centers*
Lifting, loading and conveying equipment..	20-25%	15-20%
Industrial vehicles	35-40%	20-25%
Systems and specialized equipment	35-40%	10-15%

End-User Establishments

The Port of Singapore Authority (PSA) is by far the largest user of materials handling equipment and systems in Singapore. The PSA operates five major port areas in Singapore and is constructing an inland container port and another major port from reclaimed land. There also are plans to develop a new air-sea cargo terminal by 1980. The equipment at the container port is comparable with that of other container ports around the world. There are presently three quay cranes, and a fourth will be installed soon; two more are to follow by 1976. The straddle carriers used are also the latest models. They use an IBM 370 computer system for tracking containers. New purchases will include forklifts—particularly heavy duty ones for containers stacking—and mobile cranes. Consideration is being given to automated warehousing systems, but these will not be implemented before 1975.

Facilities at the Jurong bulk handling port also compare favorably with other bulk handling ports around the world. However, the most sophisticated equipment here is for the transmission of petroleum, which is outside the scope of this report.

Caterpillar, itself a major materials handling equipment firm, has one of the largest regional distribution centers in Singapore. Their Singapore plant stocks parts for their equipment, which is used throughout Southeast Asia. Although Caterpillar is not yet in the materials handling business in Singapore, being primarily a supplier for the construction industry, their Parts Distribution Center uses a significant amount of materials handling equipment in its internal operations.

Caterpillar employs approximately 125 people in its plant in the Jurong industrial estate, and a major expansion of the plant is now in the final stages. The firm expects sales to grow at about 10% and its use of materials handling equipment to increase at a slightly higher rate. Caterpillar's materials

Table 1.—Singapore's Imports of Materials Handling Equipment
(Thousands of U.S. dollars)*

	1970	*1971*	*1972*	*1973 ***	*1975 ***
Lifting, loading & conveying machinery and accessories	*15,786*	*23,920*	*31,625*	*38,300*	*60,000*
Hoisting machinery (incl. cranes)	14,532	21,097	28,802	33,000	45,000
Jacks, pulleys & tackles, (incl. parts)	440	722	1,955	2,800	4,000
Belts, conveyors & other loading & handling machinery	814	3,424	868 (thru June)	2,500	6,000
Industrial vehicles and accessories	*3,378*	*2,699*	*4,133*	*5,500*	*9,000*
Tractor & forklift trucks (main materials handling equipment category)	2,559	1,648	2,405	3,500	6,000
Other industrial trucks	402	663	1,126	1,250	1,800
Parts for forklift trucks & tractors	417	388	582	750	1,200

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* 1970 S$3 = US$1; 1971 S$2.82 = US$1; 1972 S$2.79 = US$1; 1973 S$2.47 = US$1.
** Estimate.

Table 2.—Singapore's Exports of Materials Handling Equipment
(Thousands of U.S. dollars)*

	1970	*1971*	*1972*	*1973 ***
Lifting, loading & conveying machinery and accessories	*1,717*	*2,498*	*2,762*	*3,000*
Hoisting machinery (incl. cranes)	1,296	1,791	2,251	2,400
Jacks, pulleys & tackles, (incl. parts)	99	312	154	300
Belts, conveyors & other loading & handling machinery	322	395	357	600
Industrial vehicles & accessories	*498*	*570*	*582*	*655*
Tractor & forklift trucks (main materials handling equipment category)	410	460	418	450
Other industrial trucks	16	55	62	75
Parts for forklift trucks and tractors	72	55	102	130

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* 1970 S$3 = US$1; 1971 S$2.82 = US$1; 1972 S$2.79 = US$1; 1973 S$2.47 = US$1.
** Estimate.
Source: Singapore Government Department of Statistics. Data covers Singapore classifications 719.31, 719.32, and sub-classifications thereof.

handling operation is more sophisticated than that of most of the other firms in its sector. It has a considerable investment in equipment, including 9 forklift trucks, 2 six-ton overhead cranes, and 3 one-ton cranes. It is one of the few firms to use a computer for inventory control, including location of stock. The firm's warehousing is not yet automated, but as its sales volume increases this becomes a distinct possibility.

Domestic MHE Industry

The domestic materials handling equipment industry in Singapore is very small. There are two firms (non-U.S.) assembling forklifts here, and several manufacturers of conveyors, hand trucks and wooden pallets. Most of the major users of materials handling equipment and systems import their equipment from the United States, Japan or Europe. Lees, a New Zealand firm, has a subsidiary here to assemble forklifts, as does Fetim, a Bulgarian-owned firm.

The local manufacturing industry is unlikely to grow very much. This is due to the relatively small size of the local market in Singapore and the fact that the more advanced materials handling equipment can still be made more cheaply in Japan or the United States, because of their supporting industries and more skilled labor forces. Another factor limiting the growth of local manufacturing is the lack of tariffs against materials handling equipment imported into Singapore. This makes it unnecessary to manufacture here to compete in the local market. However, manufacturing of advanced materials handling equipment would certainly be welcomed by Singapore.

Table 3.—Singapore: Imports by Country of Origin
(Thousands of U.S. dollars)*

	1971	*1972*	*1973***	*1975***
Lifting, loading & conveying equipment				
U.S.	8,591	7,550	10,000	16,000
Japan	8,660	10,491	......	......
U.K.	3,383	5,109	......	......
All others	3,286	8,475	......	......
Total	23,920	31,625	38,300	60,000
Industrial vehicles and accessories				
U.S.	223	113	250	560
Japan	1,200	1,781	......	......
U.K.	974	1,831	......	......
All others	302	388	......	......
Total	2,699	4,113	5,500	9,000

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* Exchange rates: see footnote in Table 1.
** Estimates for U.S. share and total market.
Source: Singapore Government Department of Statistics.

Market Development Data

End-users report that they have good relationships with U.S. suppliers of materials handling equipment and systems. They have little complaint over service of the equipment and training of the operators. The main hindrance to the use of U.S. equipment is the price. This is especially true in the case of the PSA, which must submit public tenders for the purchase of materials handling equipment and systems. Port officials report that about 80% of the time they take the lowest bid which meets their specifications. This means they buy mostly from Japanese or European manufacturers. In many cases, the European manufacturer is a subsidiary of an American firm. The remaining 20% of the time the deciding factor is either quality, service or availability. American equipment is still recognized as having the best quality, although delivery can be a problem. This is caused more from lack of production by U.S. manufacturers for the export market than actual shipping time. Caterpillar, Allis Chalmers and J. I. Case, to name but a few, all have major distribution centers here and can readily supply the equipment if their orders can be filled expeditiously by the U.S. plants.

Regulations

There are no barriers, tariff or otherwise, to the importation of materials handling equipment and systems into Singapore. The recent international currency realignments have had a positive effect on the sales of U.S. equipment. Prices of U.S.-made equipment are practically on a parity with non-U.S. made equipment in some lines, particularly in the heavier equipment models, and the remainder are now becoming price competitive. Most of the movement has been in an upward trend of Japanese prices. For the most part, U.S. equipment still costs the same in Singapore dollars. However, especially for private industry, U.S. equipment is now a good buy because of the acknowledged superiority in quality. Except for the more advanced materials handling equipment the public sector will continue to buy predominantly Japanese.

Turkey

There is a growing domestic production of materials handling equipment in Turkey. This is encouraged by the government. Local production includes standard conveyor systems, cranes, lifts and some industrial materials handling vehicles. Such production only partially meets the total demand for materials handling equipment and systems in Turkey, which still relies on imports of completed units and components. Imports of materials handling equipment and systems during the next 5 years or so may amount to approximately $30 million annually. The United States should expect a large share of this market. The c.i.f. delivered prices for U.S. materials handling equipment and systems have been generally higher than products from Europe but recently the price difference is smaller. U.S. products now are more competitive, and there exists a preference for the higher quality U.S. equipment. Unfortunately, some Turkish Government agencies reportedly are required to buy from the cheapest source, irrespective of quality. U.S. suppliers should improve their deliveries for complete units and parts and show more flexibility in coping with local problems and technicalities. Agents and principals should be alert to the possibility of local assembly/manufacture, either on a joint venture or licensing basis. On those items not feasible for local production, it is imperative to offer the most competitive price and terms possible, particularly in bidding on government tenders.

Statistical Analysis

Statsitics on manufacturing and assembling of materials handling equipment and systems in Turkey are not readily available. However, there is local production of various materials handling equipment carried out by both private and public sector firms. Elevators, hoists, belt and bucket conveyors, forklifts, cranes, etc., are presently being manufactured/assembled in Turkey, but such production only partially meets market demand and quality requirements. As Turkey's industrialization proceeds, further sophistication in product and capacity to produce materials handling equipment and systems equipment should be expected.

Table 1 contains data on Turkey's imports of materials handling equipment and Table 2 shows the share imported from the United States and other leading supplier countries for the years 1970-1972.

According to U.S. Department of Commerce statistics, U.S. exports to Turkey of "mechanical handling machinery and equipment" (SITC No. 719.3) were valued at $1.95 million in 1972, $6.9 million in 1971, and $3.2 million in 1970.

1973 Imports and Forecasts

According to Turkey's State Institutes of Statistics, that country's imports of materials handling equipment falling under BTN 84.22 (*), during the first quarter of 1973, totaled approximately $7.7 million, of which the United States supplied $578,000, compared to West Germany's $831,000. Most of the imports from the United States for this period fall under 84.22.90—"unspecified items". Imports of spare parts under No. 84.22 for this period totaled $4 million, with the largest shares coming from the United Kingdom and West Germany and only an insignificant amount from the United States. Imports under BTN 87.07 (*) were not significant during this period. It is estimated that imports of materials handling equipment and systems under No. 84.22 and 87.07 for 1973 will exceed $25 million and perhaps reach $30 million or more annually by 1976. The outlook for an increase in the U.S. share of this market is good. U.S. prices are reportedly more competitive and American firms are demonstrating greater interest in the market. Regarding the improved competitive price position, an American regional representative of a large U.S. manufacturer of materials handling equipment commented that

Table 1.—Turkey: Imports of Materials Handling Equipment

(Thousands of Turkish Liras)*

	1970	1971	1972
Lifts	1,645	1,643	9,413
Pulleys, tackles & hoists	2,140	536	3,980
Jacks	2,242	1,134	1,118
Marine winches & capstans	1,004	3,628	574
Other lifting	......	1,686	1,316
Cranes	36,343	36,815	82,302
Other loading & conveying	30,273	56,184	108,876
Spare parts for above	9,922	28,415	65,032
Industrial vehicles	5,141	20,933	25,314
Tractors for r.r. stations	......	......	319
Spare parts for above	1,400	1,737	1,253
Total	91,110	152,711	299,596

* Exchange rates: 1970, TL15.00=US$1; 1971-72, TL14.30=US$1.

(*) The Turkish Customs and Tariff No. 84.22 includes lifting, handling, loading, or unloading machinery, conveyors such as lifts, hoists, winches, cranes, transporter cranes, jacks, pulley tackle and belt conveyors and parts. (Excavating, levelling, boring, etc., machinery for earth, mineral and ore operations, are excluded under No. 84.22). The Turkish Customs and Tariff No. 87.07 covers work trucks of types used in factories or warehouses for short distance transport or handling of goods such as forklift trucks and platform trucks, and tractors of types used on railway station platforms.

Table 2.—Turkey: 1972 Imports of Materials Handling Equipment by Major Supplier Countries

(Thousands of Turkish Liras)*

Lifts	U.S.	2,239
	Japan	5,843
	Hungary	409
	W. Germany	406
Pulleys, tackles & hoists	U.S.	38
	Italy	808
	USSR	739
	Belgium-Luxembourg	533
	W. Germany	514
Jacks	U.S.	451
	France	411
	W. Germany	116
Marine winches & capstans	U.S.	......
	W. Germany	458
	Norway	116
Other lifting	U.S.	846
	Sweden	319
	Belgium-Luxembourg	819
Cranes	U.S.	19,722
	USSR	40,359
	W. Germany	6,926
	Italy	4,645
	France	3,915
Other loading & conveying	U.S.	15,417
	France	19,080
	USSR	12,725
	Sweden	3,856
Spare parts for above	U.S.	2,093
	USSR	34,300
	France	20,362
	U.K.	4,976
Industrial vehicles	U.S.	5,132
	W. Germany	5,123
	USSR	4,265
	France	2,739
Tractors for r.r. station	U.S.	......
	W. Germany	391
Spare parts for above	U.S.	241
	Belgium-Luxembourg	646
	W. Germany	366

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* Exchange rate: TL 14.30=US1$.

"the shoe is now on the other foot and we are beginning to do well in this market." As the manufacturing/assembling of materials handling equipment and systems in Turkey expands, the business of supplying this industry with necessary components and parts will grow in importance.

Imports 1970-1972

Imports under BTN Nos. 84.22 and 87.07 (see footnote on previous page) totaled approximately $6.5 million in 1970. In 1971, these increased to about $11 million, with cranes comprising approximately $2.5 million of the total and the category "other", $3.9 million. Spare parts amounted to about $2 million, while approximately $1.5 million worth of "work trucks, mechanically propelled, used in factories and warehouses" were imported that year. Imports of materials handling equipment totaled roughly $22 million in 1972, with the United States supplying equipment valued at around $4 million. The most significant items under BTN 84.22 were: the unspecified item "others," which amounted to $7.5 million with about $1 million coming from the United States; "spare parts," which totaled $4.5 million, with about $150,000 from the United States, and cranes, $6 million, with $1.4 million from the United States (but $3 million from the U.S.S.R.). Other items of importance to U.S. suppliers that year were mechanically propelled work trucks used in warehouses and factories, approximately $2 million($365,000 from the United States) and "lifts" $650,000, with $160,000 from the United States. The United Kingdom, West Germany, Italy, and the U.S.S.R. appear to be our strongest competitors, but Japan is posing a growing threat.

Exports

Exports of materials handling equipment from Turkey are insignificant. The first statistical record of exports appeared in 1971, when $80,000 worth of cranes were exported to West Germany. Only a small amount of parts and accessories were recorded thereafter to West Germany.

Demand Factors

The dominant factor influencing total market demand for materials handling equipment and systems equipment and parts is the rapid economic and industrial development occurring under Turkish Government support and policy. This industrialization process contributes heavily to the demand for all types of materials handling equipment and systems. Increasing labor costs and the need for greater speed in production and in handling materials for mechanized production result in increasing demand for materials handling equipment and systems. Improved capacity of consumers to buy and of the Government to provide foreign exchange are relatively recent developments affecting market trends. Improved foreign exchange reserves (approximately $2 billion) supported by Turkish workers' remittances (estimated to reach $1 billion during 1973) has permitted the Government to relax import restrictions. Most businessmen are optimistic regarding the economic outlook and anticipate an upsurge in capital investments after the October 1973 general elections.

The demand for materials handling equipment and systems is closely related to Turkey's infrastructural projects and development of the manufacturing industry. During its present Five-Year Development Plan (1973-1977)—FYDP—Turkey plans to average approximately 12% annual growth in the industrial sector. Investments projected for this 3rd FYDP amount to TL280 billion[1] including TL40 billion for the transportation industry, TL16 billion for the mining industry, and for the manufacturing industries around TL88 billion, of which TL54 billion are earmarked for intermediary goods manufacturing such as iron and steel mill products (TL15 billion), and non-ferrous metals (TL7 billion). An estimated TL11 billion will go into the production of investment goods (machinery manufacturing projects and metal goods production), and TL15 billion will be spent on industries producing consumer goods, such as textile and food processing industries.

Sales Potential

Special conveyors, cranes, and industrial vehicles, including forklifts and loaders, appear to enjoy highest sales potential at present.

Lifting, loading and conveying equipment.—During the next few years, special conveyors, particularly stainless steel, will be in demand as a result of emphasis on fresh fruit, vegetables, and other food processing projects. Pneumatic conveyors will be needed for handling cereals. In addition to the food industry, the demand for conveyors is expected to increase because of developments in copper, fertilizer, coking plants, thermal power stations, palletizing plants, cool washeries, sinter and steel plant projects. To a large extent this demand will be met by local production.

Turkey apparently will need improved bulk materials handling port facilities for fertilizer, cereals, chemicals, and industrial raw materials. Dock materials handling facilities must be modernized to help meet anticipated developments in iron and steel, crude petroleum and refining, and pipeline and mining operations, and to handle more efficiently imports of heavy machinery for Turkey's developing industrial and infrastructure facilities. Locally made conveyors do meet some of these requirements but have quality, size, and life limitations. A need for greater efficiency, safety, quality, and capacity factors encourages a preference for foreign made equipment.

The category of cranes appears to offer a high sales potential. This category would include crawlers; diesel electric, overhead traveling, shipyard, industrial and railway cranes; log loading cranes with hydraulic grips; truck mounted cranes, etc. Locally made cranes have limitations in lifting capacity, efficiency and safety factors. A leading agent for a U.S. supplier commented that bifilar cable cranes having 2-tons hook lifting capacity, radial cranes, and skip carriers will be required for the Oymapinar Dam and hydropower project. The Elbistan lignite production and power project will require conveyors, a 120-ton traveling crane, several 15- to 45-ton cranes, 4-ton elevators, and other materials handling equipment.

Industrial vehicles.—Forklift trucks, wheel and crawler loaders, and truck mounted cranes appear to enjoy a high sales potential. Forklifts are now used extensively in a diversified range of industrial establishments in Turkey. The increasing awareness by potential buyers of the cost savings features of materials handling equipment and systems is creating a growing market for 1½-ton to 10-ton forklift trucks, with the 3- to 5-ton lifting capacity sizes being most popular. Agents estimate that Turkey's commercial forklift truck requirements amount to about 250 in 1973 and from 250 to 300 units for the next several years. They also estimate that the annual wheel loader requirements for 3 to 4 years would be around 150 units, valued at over $6 million, for construction, mining work, and bulk material handling. An American representative for a U.S. supplier estimated that within the next 5 years the annual private and government market in Turkey for 2-cu.-yd. front-end wheel loaders alone will amount to 100 or more units. A cement industry official estimated that during the Third Five-Year Development Plan loader requirements for his industry could total 50 units. A leading consulting engineering firm commented that mobile cranes of 60 tons and over 40-meter lifting capacity would be particularly needed in Turkey. The market in Turkey for mobile cranes has been estimated at about 50 to 100 units per year.

Systems and specialized equipment.—The need for materials handling specialized systems and equipment becomes more apparent as Turkey's general industry and manufacturing sectors expand. Firms dealing in storage, warehousing, bulk handling and packaging operations indicate an increasing demand for specialized handling systems.

An official of the Ministry of Industry and Technology as a rough estimate thought Turkey's total annual imports of all materials handling equipment and systems during the Third Five-Year Development Plan (1973-77) period would exceed $30 million.

End-User Market Analysis

Rapid developments are occurring in a number of Turkey's materials handling equipment and systems market sectors which should be of interest to U.S. suppliers.

Transportation Sector.—Turkish State Railways (TCDD) officials state that there are plans to improve materials handling facilities at six Turkish ports, and that feasibility studies are now being prepared for presentation to the International Bank for Reconstruction and Development (IBRD) with a request for financing foreign exchange costs of about $16 million. These projects will involve 3-ton and larger forklift trucks, 5-ton mobile cranes, 25- to 30-ton mobile cranes, 5-ton electric cranes, bridge cranes, floating cranes, and large stationary cranes. In addition to this, the Maritime Bank, which operates shipping lines and manages various ports, also plans improvements in materials handling equipment and port handling facilities. The TCDD has also embarked on a large railroad rehabilitation and modernization program with IBRD assistance. The equipment to be imported on an international competitive basis will include eight emergency cranes valued at over $1 million and other equipment for workshops. The TCDD recently issued a tender for 18 forklift trucks, self-propelled mobile 5-ton and 25-ton cranes, quay cranes, etc. There is a repetitive requirement by the TCDD for these and other types of materials handling equipment, which constitutes a continuing potential market for U.S. suppliers. TCDD also manufactures 10-ton capacity mobile cranes, workshop cranes, gentry cranes, lifts, etc., for its own use.

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[1] US$1 = TL14.

Turkey's highway system is continuously being expanded and improved, and the freight transportation industry enlarged and modernized. The Highway Department is planning to spend approximately $7 to $8 million during the next 4 to 5 years for rubber-tired and crawler loaders, cranes, and other materials handling equipment. The freight forwarding and handling industry is represented by over 100 firms, all of which require various types of handling equipment, including cranes and forklift trucks.

Turkey's airports are being modernized and expanded and new airports are being built. These require modern materials handling equipment and facilities. An official from the State Airports Administration estimates that at least 10 rotary type luggage conveyors, a number of rubber-tired special loaders, 10 to 12 forklifts, and other special materials handling equipment will be required for the efficient operation of Turkey's airports. Turkish Airlines (THY) will also require towing cranes, cargo loaders, emergency cranes, towing tractors, special refreshment trucks with elevator type bodies, and other equipment.

Food processing and marketing industry sector—Turkey's natural resources and geographical location favor development of the food processing industry, which is creating a market for specialized handling systems and conveyors and forklift trucks, as well as equipment for grading, sorting, packaging, and storing. The IBRD and the International Development Association (IDA) have provided foreign exchange financing in this sector amounting to $25 million, most of which will be used for trucks, containers, refrigerated trailers and ferries, packaging house equipment, and other related handling equipment. More important, this substantial help will influence developments in all aspects of the fresh fruit and vegetable processing industry and stimulate requirements for handling equipment and systems. Estimates of overall foreign exchange needs for this sector, including materials handling equipment and systems, range as high as $20 million per year for the next several years. Numerous food processing projects have been approved for implementation during this period. These include tomato paste plants, vegetable oil projects, vegetable powder (onion, carrot, tomato, celery) processing, fruit extract projects, food plants, fresh fruit and vegetable cleaning, sorting and packing operations.

Annual production increases obtained in the *metal goods fabrication sector* during the first and second planning period was 7.3% and 9.2%, respectively. An average annual growth of about 16% is envisaged in this sector throughout the years 1972-77, and the TL3.5 billion production value for 1972 is expected to rise to TL14.2 billion by 1982. According to the Statistical Yearbook of Turkey for 1971, based on 1963 census of manufacturing and business firms, 29,639 establishments were active in this industry sector, which excludes the machinery manufacture and electrical goods industries. This sector is a good consumer of forklift trucks and other materials handling equipment.

Initial market penetration in Turkey is difficult, but according to local agents there are both an untapped potential and a ready market for materials handling equipment and systems. Initial sales are important because they serve to consolidate and strengthen cost-saving concepts which on the whole have not been adequately ingrained in the minds of many managers. The younger industry managers travel often, however, and become aware of innovations and utilize these to the extent possible in specific industries which are being established in Turkey.

Turkey's public sector enterprises, which reportedly still lack efficiency in management, are gradually recognizing the need for using materials handling equipment and systems. Private sector firms appear to grasp more quickly the cost savings advantages and are more willing to use materials handling equipment.

The import market is, of course, affected by government protection that is given to local manufacturing and assembling enterprises. Concern is expressed occasionally on the effect materials handling equipment and systems has on Turkey's unemployment problems. For example, a forestry official recently complained about the difficulty of mechanizing forestry operations. Turkish laws give special consideration to the employment of villagers living near forestry development areas rather than the utilization of modern handling equipment. Even this is gradually changing, however, and the market for logging and other timber handling equipment will improve. The Government is presently preparing studies on eight forestry projects which, if implemented, will require various types of handling equipment, including about 16 loading cranes.

End-User Establishments

The following two profiles were chosen to represent typical private sector firms.

In the metal fabrication sector, *Arcelik A.S.*, Cayirova, Istanbul, is the largest Turkish manufacturer of refrigerators, washing machines, self-propelled combines, space and bath water heaters, and office furniture. The plant is equipped with overhead cranes used in the assembly of components. The manipulation of steel plates is done with forklift trucks. The company recently decided to set up a separate plant in *Eskisehir,* Turkey, to manufacture household refrigerators. The degree of modernity of production equipment in this plant is reportedly equal to a comparable plant of more or less similar size in Europe.

In the food processing sector, *Fruko Tarek Meyva Sulari A.S.*, Merter Sitesi, Topkapi, Istanbul, Turkey, is a manufacturer of soft drinks and fruit juices, tomato products, ready-made foods, jams and compote. The entire bottling line, as well as the manipulation process, from bins to wringers and from tanks to the concentration phase, is fully automated. The manager of this enterprise remarked that the equipment owned by his firm and his three largest competitors possesses about the same degree of modernity, but that many small establishments in Turkey continue operating along primitive lines.

Domestic MHE Industry

Elevators, hoists, monorails, some types of belt and bucket conveyors, cranes, and some industrial vehicles are produced locally. One Turkish firm is engaged in manufacturing a mobile excavator/crane on license from Sonne Bogen of West Germany, with major components, such as engines, transmission and gear boxes, imported. The firm of Standart Belde Ticaret ve Sanayii A.S., a company affiliated with Koc Holding, a large diversified Turkish business complex which controls nearly 60 individual manufacturing and marketing companies, plans to manufacture/assemble forklifts on license from a U.S. company. Standart Belde, fearing discontinuity in supplies of imported components such as gear boxes and engines (which account for about 70% of the overall components) and disruptions in the flow of accessories from local manufacturers, is inclined to begin this project on a moderate scale. (The share of imported components is expected to drop when another project to build engines and gear boxes in Turkey goes through). Tentative plans are to manufacture/assemble 250 diesel- or gas-powered forklift trucks per year. Sizes would range from one to 3 tons capacity; production would be doubled after about 5 years. Local production of materials handling equipment and systems is done by both private and public sector firms. However, production is at a relatively early stage and has its limitations as to efficiency, safety, capacity, performance, and quantity.

Lifting, loading, and conveying equipment.—Cranes, (bridge, gantry, pillar), derricks, elevators, hoists, monorails, and conveyors (bucket, belt, cable, and roller types), jacks, lifts, and escalators are locally manufactured/assembled. Some foreign licensing arrangements have been concluded for locally made lifts. These include the West German firms Wertheim, Hidrolift, and Otis, and the Swiss firm Schilieren.

Industrial vehicles.—Locally made items in the category of industrial vehicles, include small range dumpers, forklifts as an attachment to tractors, load carriers, and platform trucks. Half-ton and 2 ton capacity forklifts manufactured by an *Izmir* firm reportedly did not perform satisfactorily and the project was suspended, at least temporarily.

Systems and specialized equipment.—Vibrating feeders are locally made. However, most specialized materials handling equipment systems are imported into Turkey to meet technical requirements. Private sector enterprises in this business are relatively small- or medium-size firms, and only a few of them employ 100 to 150 workers. The most important private firm manufacturing materials handling equipment and systems in Ankara is Isik Kollektif Sirketi, Iskitler Caddes, Samyeli Sokak 3, Ankara, Turkey. This firm manufactures cranes (overhead traveling, jeep, roof, gantry, foundry, derrick types), as well as ship loaders, lifts, penstocks, discharge conduits, butterfly and gate valves, spillway roller gates, high pressure slide gates, electrical control systems, crushing, sieving, washing and mixing machinery, automatic feeders, belt and screw conveyors, weighing and loading hoppers, etc. Dr. Orhan Isik, president of the firm, has a new plant under construction in Ankara on a 40,000-square-meter lot. Dr. Isik commented that his current workshop of 3,640 square meters is too small to meet demand.

Apart from private sector firms, some State-owned and operated industrial enterprises also manufacture/assemble materials handling equipment and systems, including cranes, conveyors, tankwagons, open type freight cars, screening, crushing machinery, etc.

Local manufacturers of mobile cranes over 3 tons and monorails are permitted to import rails, spares, electric motors, capacitors, relays, flexible crane wires, etc., provided that firms applying for foreign exchange have a capital not less than TL1 million and employ not less than 4 engineers and 30 workers. Local manufacturers of lifts are permitted to import pertinent parts (not locally made), generators, electrical capacitors, relays, fuses, and fittings. These firms are required to employ at least 33 workers and two engineers—mechanical and electrical—in order to apply for foreign exchange allocations.

Local industrial enterprises producing/assembling materials handling equipment and systems do not engage in mass production but operate generally on an order basis.

Leading businessmen believe that local manufacturing of materials handling equipment and systems will increasingly meet local demand, particularly for cranes, conveyors, and lifts for mining, construction, industrial and other operations. They note that there is not presently a strong demand for foreign know-how in local manufacturing/assembling operations related to materials handling equipment and systems. Others believe that this will change. Factors such as special technical requirements, limited financial capacity of local enterprises, urgency in delivery, efficiency in performance, create a preference by some Turkish clients for foreign-manufactured equipment and especially in turnkey projects or projects financed under a foreign credit arrangement.

A Turkish engineer stated that certain types of locally made mobile cranes are essentially satisfactory for Turkey's average requirements. He also noted that locally made bucket type conveyors can meet domestic demand but that the manufacturing of pneumatic conveyors is technically not satisfactory. Businessmen and Turkish Ministry of Industry officials consider the locally made forklifts industry as primitive and not yet at a state of development that would require the imposition of import restriction.

Market Development Data

Leading Turkish distributors and end-users of materials handling equipment and systems generally agree that U.S. prices are more competitive because of foreign currency revaluation by major competitors. A leading U.S. supplier of materials handling equipment and systems emphasized that his firm is now in a good position to benefit from its improved competitive position in Turkey. End-users generally agree that U.S. products are more attractive, not only because of more competitive prices but also because of the high quality of U.S. products already introduced into the Turkish market. A Turkish distributor complained, however, that U.S. firms were having delivery problems due to increased business during the first quarter of 1973 all over the world. Turkish end-users find the distance factor between the United States and Turkey a hindrance to sales. They indicate that Turkish vessels do not have frequent sailings to the United States but call on major European ports often. Public sector end-users pointed to the Government of Turkey requirement for public sector enterprises to utilize Maritime Bank owned and operated Turkish vessels for shipment of goods, and emphasized that the distance factor functions at a disadvantage to U.S. shipments to Turkey.

The following views on how to improve supplier-customer relations were expressed by Turkish businessmen:

> U.S. firms should more closely follow developments in Turkey's economy and investment projects and should periodically call on major clients. U.S. firms should also be more selective in choosing aggressive agents/distributors.
>
> After-sales service should be handled to please Turkish clients and technical assistance given to the extent required. U.S. suppliers and their agents should be more responsive to inquiries on technical problems and requests for training.
>
> United States materials handling equipment suppliers should establish good relations with Turkish consulting engineering firms in charge of feasibility studies and design work on new investment projects so as to assure U.S. firms' involvement.
>
> U.S. firms should establish close relations with large contractors in charge of construction and erection works for major projects.
>
> There should be more flexibility in coping with local problems, and quicker delivery of machinery and parts.
>
> U.S. firms should be prepared to become involved in the assembling business in Turkey.

U.S. firms should be in a good position to take advantage of their worldwide operations to penetrate the Turkish market more aggressively and under a more favorable competitive position than suppliers of other countries. The complexity of Turkey's trade controls, its preference for doing business on a face-to-face basis, and the scattering throughout Turkey of its developing industry means that U.S. firms should assign competent, aggressive, eager, and technically well qualified agents. The consensus of end-users seems to be that, with few exceptions, the Europeans and Japanese are doing a far better job of selling. U.S. suppliers and their agents should make more effort to develop the market and not to confine their sales contacts to clients in only one or two major cities of Turkey. It is necessary to maintain the combination of a good local agent, more frequent and timely visits by U.S. representatives, more active and aggressive year-round sales effort, more responsiveness to customer needs—both before and after sales—and close acquaintance with major potential clients, if U.S. firms expect to obtain a greater share of the market for materials handling equipment and systems in Turkey on a continuing basis. It should not be forgotten that on major projects the source of financing determines the source of supply for materials handling equipment and systems.

Regulations

According to Turkey's current import regulations, completed units of materials handling equipment may be imported with foreign exchange provided for public and private sector investment requirements within the liberalized import list and also under large dollar allocations established within the quota list for emergency requirements. Special quota allocations are also established to meet the requirements of the shipbuilding industry, the transportation industry, and newly established industries. Components for local manufacturers may be imported under the Liberalized (free) List as well as the quota list. Import requests for completed units are considered under the pertinent list and approval made by the appropriate government agency. The status of local manufacturing has an effect on the import approval decision. Consideration is given to price differentials between locally made equipment and imported equipment as well as to quality and efficiency. Parts for industrial trucks and tractors may be freely imported under the Liberalized List. An annual allocation of $20,000 for importers is included in the present Import Regime for Hydraulic Jacks. Elevator manufacturers bring in their requirements from a special annual quota of $1 million distributed by the Ministry of Industry and Technology. An annual quota of $660,000 is likewise set aside for manufacturers of gantry cranes with a capacity of more than 3-ton and monorails.

It is apparent that to the extent possible local production of materials handling equipment and systems will be encouraged and major market sectors will be expected to buy locally manufactured equipment if it will do the job. In other words, while imports of complete units of selected materials handling equipment and systems will continue to be controlled, the imports of component parts could increase. Although U.S. prices are reportedly becoming more competitive in Turkey, market-division agreements with licensors or subsidiaries in Europe sometime preclude exports of U.S.-made products to this area. For example, one Turkish buyer recently complained that the agent for a large U.S. manufacturer of materials handling equipment refused to supply equipment from the United States and insisted the product could only come from its European subsidiary. The buyer refused to accept this and made his purchase elsewhere.

Supplementary Information for U.S. Exporters

EXPORT INFORMATION SERVICES

The U.S. Department of Commerce provides a wide range of information services to assist business firms in their export activities. Recently modernized handling techniques have substantially reduced the length of time required to procure the information for the businessman.

The information services listed below can be obtained by contacting the nearest U.S. Department of Commerce district office or by writing directly to the Export Information Division/OED/DIBA/266, U.S. Department of Commerce, Washington, D.C. 20230.

World Traders Data Reports

World Traders Data Reports (WTDR's), formerly known as World Trade Directory Reports, provide descriptive background information on specific foreign firms. Prepared by the U.S. Foreign Service, the WTDR's include such information as year of establishment, method of operation, lines handled, size of sales territory, name of chief executive, general reputation in trade and financial circles, names and addresses of credit sources, names of the firm's trading connections, and other commercial information. The complete name, street and city address of the foreign firm must be given when requesting this service. The price is $5 per report.

Agent/Distributor Service

The Agent/Distributor Service (ADS) is designed for the businessman who needs assistance in identifying potential foreign agents or distributors. The information, which is provided by the U.S. Foreign Service, consists of up to three names of such prospects. Up to 30 days are required from date of receipt to complete the request. The charge for this service is $10.

Trade Opportunities

Trade Opportunities (TO's) are inquiries by overseas companies expressing interest in purchasing U.S. products and services or in representing U.S. firms. They can come from private commercial services, foreign governments, or multinational organizations such as the United Nations and NATO.

Over 12,000 TO's are received each year by telex from U.S. Foreign Service posts around the world. In Washington they are computer-matched to the specifications of subscribing U.S. suppliers, who are then notified of appropriate inquiries by mail—all within one week of a TO's origination overseas. Subscribers specify their product, country, and type-of-opportunity interests and pay for the TO's, priced at 50 cents each, in advance. Subscriptions of $25, $50 and $125 are available. Firms wishing to receive TO's on a regular basis should contact their nearest Commerce Department district office for further details.

Export Mailing List Service

The Export Mailing List Service (EMLS) is the modernized version of the popular Trade Lists which were purchased by U.S. businessmen at the rate of 35,000 copies per year. The EMLS provides lists of foreign firms considered suitable for export contact purposes. Firms are drawn from the automated Foreign Traders Index. Their names and addresses are available on gummed mailing labels or in standard printout format. Printouts also include: name and title of an office, type of organization, year of establishment, relative size, number of employees and salespersons, and product and/or service codes (Standard Industrial Classification numbers). A basic "set-up" payment of $15, applicable to each retrieval, must accompany each request.

This charge covers payment for up to 300 printed names. An additional 5 cents is charged for each name above 300. Delivery can be made in about 15 days.

FTI Tape Service

This service is offered as a convenience to firms that have a continuing need for a broad range of foreign commercial data, such as export management firms selling a wide range of products. This service provides, in magnetic tape form, information on all firms in one or more countries covered in the Foreign Traders Index. Users may thus retrieve various segments of FTI data by running tapes through their own computer facilities. The charge for this service is $177.50 per country, up to 15 countries. The costs of the data for 15 or more countries or for the entire file is $2,500.

Other Services

Business counseling services are provided both at the U.S. Department of Commerce in Washington and at the Department's 43 district offices (see *Commerce Contracts for U.S. Business* section of this Survey for full listing). Visitors to Washington are served by the Business Counseling Section, which provides in-depth counseling and schedules appointments with appropriate officials within the Domestic and International Business Administration as well as with officials in other agencies.

FINANCING EXPORT SALES

The Export-Import Bank of the United States

Various export financing programs of the Export-Import Bank of the United States (Eximbank) are available to assist U.S. manufacturers and suppliers of Materials Handling Equipment and Systems. The available programs range from the Commercial Bank Exporter Guarantee Program and credit insurance offered by the Foreign Credit Insurance Association to the Cooperative Financing Facility.

In all cases, a cash payment of at least 10% of the contract price must be made in in U.S. dollars in the United States on or before delivery of the equipment. Under the bank guarantee and insurance programs, the balance must be evidenced by a promissory note or other acceptable obligation of the buyer providing for payments in U.S. dollars in the United States in approximately equal installments of principal payment not less frequently than semiannually. In rare cases annual installments will be considered. Under these same programs, the exporter is required to retain at least 10% of the financed portion for his own account and risk.

Under the Cooperative Financing Facility, Eximbank allocates a line of credit to an eligible Cooperating Institution to be disbursed to suppliers on approved transactions for purchasers in the country of the Cooperating Institution. Each transaction under the Facility shall be jointly financed through a disbursement of funds by Eximbank and the Cooperating Institution. Eximbank's portion of the funding will be repaid at the rate of 6% per annum on outstanding balances.

The proposed repayment terms under the above-mentioned programs must conform to those considered customary in international trade.

Eximbank also has an Export Finance Counseling Service which offers advice and guidance on all Eximbank programs to suppliers and bankers, regardless of whether they have had previous experience in financing sales abroad or not.

Exporters who have encountered difficulty in obtaining financing for specific sales are requested to submit to Eximbank evidence of their efforts to obtain financing from the private financial institutions.

In the case of U.S. commercial banks and financial institutions, it is suggested that they contact Eximbank before declining an export application to assure fullest possible consideration of all alternative resources before the applicant loses a potential sale of U.S. goods or services abroad.

For additional information write to Arthur K. Obester, Project Officer, Export-Import Bank, Washington, D.C. 21568.

EXPORT CREDIT INSURANCE

The Foreign Credit Insurance Association

The Foreign Credit Insurance Association (FCIA) is an association of 50 stock and mutual companies in partnership with the Export-Import Bank of the United States. It offers a comprehensive selection of credit insurance policies which protect policyholders against loss from failure to receive payment from foreign buyers.

The benefits of this coverage may be summed up this way:

—It protects the exporter against the failure of the buyer to pay his dollars obligation for commercial or political reasons.

—It enables the exporter to offer foreign buyers competitive terms of payment.

—It supports the exporter's prudent penetration of higher risk foreign markets.

—It gives the exporter greater financial liquidity and flexibility in administering his foreign receivables portfolio.

Who May Be Insured

Virtually any corporation, partnership, or individual doing business in the United States is eligible for FCIA coverage. An exporter may apply for a policy for himself or may become insured under the blanket policy of a bank or other financial institution which holds an FCIA policy.

Eligible Products

Foreign sales of all types of industrial, agricultural, and commercial products produced in the United States and of services rendered by U.S.-based personnel are eligible for FCIA insurance.

What Losses Are Covered

Comprehensive FCIA policies protect insured against non-payment of receivables due to unforeseeable commercial and political occurrences. Commercial risks which are covered include insolvency of the buyer or protracted defaults which may well arise from economic deterioration in the buyer's market area, shifts in demand, unanticipated competition, tariffs, or technological changes. Also covered are defaults due to such buyer problems as increasing expenses, the loss of key personnel, and natural disasters.

Political risks coverage applies to defaults due to governmental action and to political disturbances such as war, revolution, and insurrection. Such events may result in confiscation of the buyer's assets, detention or diversion of shipment, or cancellation of necessary licenses by the United States or by the buyer's country. Also covered is the inability or refusal of the foreign central bank involved to convert the buyer's currency to dollars. Political coverage alone is available for exporters who desire to assume their own commercial risks.

The Policies

The policies offered by FCIA are many and varied. They can be tailored to suit the needs of the individual exporters, service groups, and financial institutions. Aside from a small application fee, all premiums are paid only for goods actually shipped.

The Master Policy combines a deductible provision, discretionary credit authority, and once-a-year reporting to provide qualified exporters with lower premiums, independent credit decisions, faster service to overseas buyers, and less paperwork. It is a blanket policy which requires the exporter to insure all or a reasonable spread of his export sales.

The Short-Term Policy is a blanket policy which covers sales on terms of up to 180 days. It provides coverage of 90% for commercial losses and 95% for political losses. A moderate discretionary credit limit is included for each buyer.

The Medium-Term Policy provides 90% coverage (political and commercial) for capital and quasi-capital goods sold on terms of 181 days to 5 years. The policy is written on a case-by-case basis so an exporter need not insure all his medium-term transactions as he would under a blanket policy.

The Combination Policy provides short and medium-term insurance to protect U.S. exporters in transactions with overseas dealers and distributors. It includes flexible coverage for short-term sales and for both inventory and receivables financing.

The FCIA also provides specially adapted policies for new exporters (*the Small Business Policy*) and for exhibitors in Department of Commerce Trade Shows (*the Exhibitors Policy*).

Special Coverage Endorsements are available for addition to the above FCIA policies. These include endorsements to cover specified preshipment risks and consignment selling.

An Aid to Financing

FCIA does not finance export sales. However, the exporter who insures his accounts receivable against commercial and political risks is usually able to obtain financing from commercial banks and other lending institutions at lower rates and on more liberal terms than would otherwise be possible.

Prequalification of Buyers

FIAC's rapidly expanding P.Q. Program is now providing immediate credit information on over 22,000 overseas buyers through its computerization data system. All the exporter needs to do is to telephone the nearest FCIA office to determine whether a particular buyer is prequalified for the amount of his sale.

Information About FCIA

More information about FCIA's services and applications for policies may be obtained through insurance agents or brokers or through FCIA's network of full-service regional offices. General questions and specific inquiries may be directed toward the FCIA Ombudsman in our New York office. Call (212) 432-6216 for a direct connection.

FCIA Offices

One World Trade Center—9th Floor
New York, New York 10048
Phone: (212) 432-6200

Suite 1003—William-Oliver Bldg.
32 Peachtree Street, N.W.
Atlanta, Georgia 30303

Suite 1552
10 South Riverside Plaza
Chicago, Illinois 60606

Suite 1435
55 Public Square
Cleveland, Ohio 44113

Suite 1790
611 West 6th Street
Crocker Bank Plaza
Los Angeles, California 90017

Suite 1110—First Federal Building
700 North Water Street
Milwaukee, Wisconsin 53202

Suite 1408—C & I Building
1006 Main Street
Houston, Texas 77002

Suite 2212
One Embarcadero Center
San Francisco, California 94111

Woodward Building—Suite 539
15th and H Streets, N.W.
Washington, D.C. 20005

TAX BENEFIT PROGRAM FOR U.S. EXPORTERS (DISC)

Exporters will want to become familiar with the provisions of the Revenue Act of 1971 (Public Law 92-178) which permit U.S. firms to establish Domestic International Sales Corporations (DISC's) entitled to a tax break on export income. Essentially, the DISC is a domestic corporation which meets certain minimal organizational requirements and limits itself almost exclusively to export sales activities. If the corporation derives at least 95% of its income from export sale, lease, or rental transactions, and 95% of its asets are export related, it can defer U.S. income tax on up to 50% of its export income. Tax-deferred retained earnings can be used to expand and promote the DISC's export business and may also be loaned to any domestic producer of export goods, including the DISC's parent company.

DISC's can be formed by manufacturers, non-manufacturers, and export groups. A DISC can function as a principal, buying and selling for its own account, or as a commission agent. It can be related to a manufacturing parent or can be an independent merchant or broker. Special intercompany pricing rules on transactions between a DISC and a related supplier or manufacturer allow a larger profit to the DISC than would normally be the case under the usual arm's lendth pricing requirements of the Tax Code.

A corporation wishing to be treated as a DISC must file a statement of election (IRS Form 4876) with the Internal Revenue Service within 90 days preceding the beginning of its tax year, for a corporation alerady in existence, or within 90 days after the date of incorporation, if newly formed.

The rules for organizing and operating a DISC are comparatively simple. Many U.S. businesses, both large and small, should be able to avail themselves of the advantages of exporting through DISC's.

For information, write Foreign Business Practices Division, Bureau of International Commerce, U.S. Department of Commerce, Washington, D.C. 20230, or phone (202) 967-4471.

COMMERCE CONTACTS FOR U.S. BUSINESS

Office of Field Operations

The 43 U.S. Department of Commerce district offices listed below represent the Department in their respective localities and assist in carrying out the programs of the Department. Under the direction of the Office of Field Operations, these district offices are staffed by experienced specialists prepared to help in the solution of business problems and assist in exporting.

ALBUQUERQUE, NEW MEXICO 87101
U.S. Courthouse—Room 316
Area Code 505 Tel. 843-2386

ANCHORAGE, ALASKA 99501
412 Hill Building
632 Sixth Avenue
Area Code 907 Tel. 272-6531

ATLANTA, GEORGIA 30309
Suite 523, 1401 Peachtree St., N.E.
Area Code 404 Tel. 526-6000

BALTIMORE, MARYLAND 21202
415 U.S. Customhouse
Gay and Lombard Streets
Area Code 301 Tel. 962-3560

BIRMINGHAM, ALABAMA 35205
Suite 200-201
908 South 20th Street
Area Code 205 Tel. 325-3327

BOSTON, MASSACHUSETTS 02116
10th Floor, 441 Stuart Street
Area Code 617 Tel. 223-2312

BUFFALO, NEW YORK 14202
910 Federal Building
111 West Huron Street
Area Code 716 Tel. 842-3208

CHARLESTON, SOUTH CAROLINA 29403
Federal Building, Suite 631
334 Meeting Street
Area Code 803 Tel. 577-4171

CHARLESTON, WEST VIRGINIA 25301
3000 New Federal Office Building
500 Quarrier Street
Area Code 304 Tel. 343-6181, Ext. 375

CHEYENNE, WYOMING 82001
6022 O'Mahoney Federal Center
2120 Capitol Avenue
Area Code 307 Tel. 778-2220, Ext. 2151

CHICAGO, ILLINOIS 60603
Room 1406
Mid-Continental Plaza Bldg.
55 E. Monroe Street
Area Code 312 Tel. 353-4450

CINCINNATI, OHIO 45202
8028 Federal Office Building
550 Main Street
Area Code 513 Tel. 684-2944

CLEVELAND, OHIO 44114
Room 600, 666 Euclid Avenue
Area Code 216 Tel. 522-4750

DALLAS, TEXAS 75202
Room 3E7, 1100 Commerce Street
Area Code 214 Tel. 749-3287

DENVER, COLORADO 80202
Room 161, New Customhouse
19th and Stout Streets
Area Code 303 Tel. 837-3246

DES MOINES, IOWA 50309
609 Federal Building
210 Walnut Street
Area Code 515 Tel 284-4222

DETROIT, MICHIGAN 48226
445 Federal Building
Area Code 313 Tel. 226-6088

GREENSBORO, NORTH CAROLINA 27402
258 Federal Building
West Market Street, P.O. Box 1950
Area Code 919 Tel. 275-9111

HARTFORD, CONNECTICUT 06103
Room 610-B, Federal Office Building
450 Main Street
Area Code 203 Tel. 244-3530

HONOLULU, HAWAII 96813
286 Alexander Young Building
1015 Bishop Street
Area Code 808 Tel. 546-8694

HOUSTON TEXAS 77002
1017 Federal Office Building
Area Code 713 Tel. 226-4281

JACKSONVILLE, FLORIDA 32207
Suite 129
4080 Woodcock Drive
Area Code 904 791-2796

KANSAS CITY, MISSOURI 64106
Room 1840, 601 East 12th Street
Area Code 816 Tel. 374-3141

LOS ANGELES, CALIFORNIA 90024
11201 Federal Building
11000 Wilshire Blvd.
Area Code 213 Tel. 824-7591

MEMPHIS, TENNESSEE 38103
Room 710, 147 Jefferson Avenue
Area Code 901 Tel. 534-3214

MIAMI, FLORIDA 33130
Room 821, City National Bank Building
Area Code 305 Tel. 350-5267

MILWAUKEE, WISCONSIN 53203
Straus Building
238 West Wisconsin Avenue
Area Code 414 Tel. 224-3473

MINNEAPOLIS, MINNESOTA 55401
306 Federal Building
110 South Fourth Street
Area Code 612 Tel. 725-2133

NEWARK, NEW JERSEY 07102
24 Commerce Street, Suite 533
Area Code 201 Tel. 645-6214

NEW ORLEANS, LOUISIANA 20130
909 Federal Office Building, South
610 South Street
Area Code 504 Tel. 527-6546

NEW YORK, NEW YORK 10007
41st Floor, Federal Office Building
26 Federal Plaza, Foley Square
Area Code 212 Tel. 264-0634

PHILADELPHIA, PENNSYLVANIA 19106
10112 Federal Building
1015 Chestnut Street
Area Code 215 Tel. 597-2850

PHOENIX, ARIZONA 85004
508 Greater Arizona Savings Bldg.
112 North Central
Area Code 602 Tel. 261-3285

PITTSBURGH, PENNSYLVANIA 15222
431 Federal Building
1000 Liberty Avenue
Area Code 412 Tel. 644-2850

PORTLAND, OREGON 97205
Suite 501 Pittock Block
921 S.W. Washington Street
Area Code 503 Tel. 221-3001

RENO, NEVADA 89502
2028 Federal Building
400 North Eighth Street
Area Code 804 Tel. 782-2246

RICHMOND, VIRGINIA 23240
8010 Federal Building
400 North Eighth Street
Area Code 804 782-2246

ST. LOUIS, MISSOURI 63103
2511 Federal Building
1520 Market Street
Area Code 314 Tel. 622-4243

SALT LAKE CITY, UTAH 84111
1201 Federal Building
125 South State Street
Area Code 801 Tel. 524-5116

SAN FRANCISCO, CALIFORNIA 94102
Federal Building, Box 36013
450 Golden Gate Avenue
Area Code 415 Tel. 556-5864

SAN JUAN, PUERTO RICO 00902
Room 100, Post Office Building
Area Code 809 Tel. 723-4640

SAVANNAH, GEORGIA 31402
235 U.S. Courthouse & Post Office Building
125-29 Bull Street
Area Code 912 Tel. 232-4321

SEATTLE, WASHINGTON 98109
Rm. 706, Lake Union Bldg.
Area Code 206 Tel.442-5615

U.S. Trade Centers Abroad

U.S. Trade Centers abroad provide U.S. manufacturers with a unique method of testing and selling key foreign markets through commercial showrooms permanently established in central marketing areas where the potential for American products is continuous. The Trade Center in Warsaw, however, does not have exhibit facilities.

Beirut, c/o American Embassy Corniche at Rue Ain Mreisseh, Beirut, Lebanon.

Buenos Aires, Avenida Quintana No. 411, Buenos Aires, Argentina

Frankfurt, Bockenheimer Landstrasse 2-4, Frankfurt am Main, Germany, Tel. 72-08-01

London, 57 St. James Street, London, S.W.1, England, Tel: Hyde Park 5921

Mexico City, 31 Liverpool, Mexico, D.F.5, Mexico, Tel: 528-5602

Milan, Via Gattamelata 5, 20149, Milan, Italy, Tel: 46-95-451

Osaka, American Merchandise Display, c/o American Consulate General, Sankei Kaikan Bldg, 9th fl., 27 Umeda-cho, Kita-ku, Osaka, 530, Japan.

Paris, 123 Avenue Charles de Gaulle, 92 Neuilly, Paris, France, Tel: 624-33-13

Singapore, c/o American Embassy, 30 Hill Street (FPO San Francisco 96699).

Stockholm, Vasagatan, 11, Stockholm C. Sweden, Tel: 08/24-84-20

Sydney, 37 Pitt Street, Sydney, NSW, 2000, Australia, Tel: 241-1031

Tokyo, Tameike Hokyu Building, 1-14 Akasaka, 1-Chrome, Minato-ku, Tokyo, Tel: 583-7141

Vienna (EastWest Trade Center) 8-10 Prinz Eugenstrasse, Vienna, Austria.

Warsaw Trade Information Center, ul. Wiejska 20, Warsaw, Poland, Tel. 21-45-15/6.

Office of Export Control

Information on U.S. export controls may be obtained from Exporters Service Branch, Office of Export Control, U.S. Department of Commerce, Washington, D.C. 20230. Telephone: (202) 967-4811.

Schedule of Events

SCHEDULE OF PROMOTIONAL EVENTS FOR GLOBAL MARKET SURVEY MATERIALS HANDLING EQUIPMENT AND SYSTEMS

The schedule of promotional events for 1974 and 1975 is intended to assist firms in developing individual global marketing plans by selecting the most appropriate activities for promoting their products in the 20 foreign countries covered in this Survey.

The Schedule provides a chronological listing, by country, covering the following types of promotional activities:

- **International Trade Fairs**—Privately sponsored, foreign managed international exhibitions in which U.S. firms may exhibit their products on an individual basis.
- **Conferences, Congresses, Seminars and Symposia**—Privately sponsored, international activities in which U.S. firms may participate on an individual basis. Some of these events are held in conjunction with international trade fairs; others are held independently.
- **U.S. Trade Center Shows**—U.S. Trade Centers, which provide year-round facilities for display and demonstration of U.S. products, hold seven to nine major products showings per year featuring displays by 25 to 35 U.S. firms.

Some of these promotional events feature materials handling equipment and systems, while others are oriented primarily to a specific end-user industry.

The information for scheduled events was obtained from market surveys and the U.S. Foreign Service. Events are arranged chronologically by country. Some may be subject to change without notice, but at the time of publication were scheduled for the dates and locations shown unless listed as "(Proposed)".

Events sponsored by or participated in by the U.S. Department of Commerce appear in boldface letters on the Schedule. Additional Commerce-sponsored activities, or those in which the Department participates, may be scheduled from time to time.

The U.S. Department of Commerce provides direct export promotion and marketing assistance to U.S. companies, employing a variety of professional promotional techniques.

- Specialized Product Shows and other marketing activities are held in permanent facilities situated in major business centers. U.S. Trade Centers are located in London, Frankfurt, Milan, Stockholm, Vienna (for East Europe), Paris, Sydney, Singapore, Taipei, Tokyo, Buenos Aires, Mexico City, Beirut, and Tehran. A Technical Information and Trade Development Center is located in Warsaw.
- **"Between Show Promotions"**—During periods betwen major shows, individual U.S. firms, or their authorized representatives, are encouraged to use the above facilities to stage one-company product promotions or sales seminars.
- **Specialized U.S. Trade Missions**—The U.S. Department of Commerce organizes and sponsors Trade Missions covering selected product themes based on available market research and Foreign Service recommendations, establishes the overseas itinerary, pays the Mission's operating expenses, and provides an Advance Officer and Mission Director.

For further information regarding Commerce events contact any one of the 43 Commerce district offices listed in Section III. Additional information on all other events may be obtained from the contact indicated in the Schedule of Event sfor the particular activity.

Schedule of Promotional Events—1974-1975

EVENT	1974	1975
ARGENTINA		
INTERNATIONAL LIVESTOCK, AGRICULTURE AND INDUSTRY EXHIBITION. Location: Buenos Aires Sponsor: Sociedad Rural Argentina, Florida 460—Buenos Aires Frequency: Biennial	July	
MATERIALS HANDLING EQUIPMENT Location: U.S. Trade Center, Buenos Aires	November	
FIDA INTERNATIONAL FOOD INDUSTRY FAIR Location: Municipal Exposition Center, Buenos Aires Sponsor: Federacion de la Industria de Productos Alamenticos y Afines Frequency: Biennial		May 11-27
AUSTRALIA		
MATERIALS HANDLING EQUIPMENT Location: U.S. Trade Center, Sydney	May	
NATIONAL PACKAGING ASSOCIATION EXHIBITION AND SEMINAR Location: Adelaide Sponsor: National Packaging Association Frequency: Annual	May	May
NATIONAL MATERIALS HANDLING BUREAU EXHIBITION AND CONGRESS. Location: Sydney Sponsor: Bureau of Transport Economics Frequency: Annual	October	October
MATERIALS HANDLING INSTITUTE MEETING Location: Sydney Sponsor: Materials Handling Institute Frequency: Monthly		

EVENT	1974	1975
BELGIUM		
PROPACK—4TH INTERNATIONAL PACKAGING SHOW Location: Centenary Halls, Brussels Sponsor: Foire Internationale de Bruxelles Palais du Centenaire, 1020 Brussels, Belgium. Frequency: Biennial	May	
INTERNATIONAL EXHIBITION OF INDUSTRIAL EQUIPMENT Location: Centenary Halls, Brussels Sponsor: Foire International de Bruxelles Palais du Centenaire, 1020 Brussels, Belgium. Frequency: Biennial	May	
INTERNATIONAL MUNICIPAL EQUIPMENT EXHIBITION Location: Palais du Centenaire, Brussels Frequency: Annual	September	September
INTERNATIONAL EXHIBITION OF UTILITARIAN VEHICLES Location: Centenary Halls, Brussels Sponsor: Salon de l'Automobile 22 rue du Luxembourg, 1040 Brussels Frequency: Biennial		January
BRAZIL		
NATIONAL MACHINERY TRADE FAIR Location: Anhembi Park, Sao Paulo Sponsor: Secretary, Alcantara Machado Comercio e Empreedimentos Rua Brasilio Machado 60—Sao Paulo. Frequency: Biennial	June	
INTERNATIONAL AUTOMOBILE SHOW Location: Sao Paulo Sponsor: Alcantara Machado Comercio e Empreendimentos Rua Brasilio Machado 60—Sao Paulo. Frequency: Biennial	November 28 December 8	
AGRICULTURE AND FOOD INDUSTRY TECHNICAL FAIR Location: Sao Paulo Sponsor: Alcantara Machado Comercio e Empreendimentos Rua Brasilio Machado 60—Sao Paulo. Frequency: Biennial		July
FRANCE		
CONTAINERS EQUIPMENT SERVICE SHOW Location: Paris, C.N.I.T. Sponsor: M. Olive, 20 Rue Carpeaux Puteaux, Paris 92 Frequency: Annual	May	May

EVENT	1974	1975
FRANCE (continued)		
INTERNATIONAL MATERIALS HANDLING EXHIBITION Location: Paris, C.N.I.T. Sponsor: M. Olive, 20 Rue Carpeaux Puteaux, Paris 92 Frequency: Annual	May	May
MECANELEM—INTERNATIONAL CONSTRUCTION MACHINERY AND MECHANICAL COMPONENTS EXHIBITION. Location: Paris, C.N.I.T. Sponsor: M. Olive, 20 Rue Carpeaux Puteaux, Paris 92 Frequency: Annual	November	November
GERMANY		
HANNOVER FAIR Location: Hannover Sponsor: Messe-Und Ausstellungs—GmBH D-6 Frankfurt Main 97 Postfach 970120, Frankfurt. Frequency: Annual	April 24 May 3	April 24 May 4
GIFA—INTERNATIONAL FOUNDRY TRADE FAIR Location: Dusseldorf Sponsor: Dusseldorf Messegesellschaft MBH Nowea Postfach 10203, Dusseldorf, 4000 Frequency: Annual	June	June
INTERNATIONAL FRANKFURT FAIR Location: Frankfurt Sponsor: Messe-Und Ausstellungs—GmBM D-6, Frankfurt Main 97, Postfach, 970120, Frankfurt. Frequency: Semi-Annual	March September	March September
CONTAINERIZATION—INTERNATIONAL CONTAINER EXHIBITION Location: Munich Sponsor: Exhibition Consultants, Ltd., 11 Manchester Sq., London, England SW 2. Frequency: Every Four Years	October	
MATERIALS HANDLING EQUIPMENT Location: U.S. Trade Center, Frankfurt		April
ITALY		
TRAMAG—INTERNATIONAL MECHANICAL HANDLING AND STORAGE EXHIBITION. Location: Padua Sponsor: Via N Tommaseo 59, Padua Frequency: Annual	October	October

EVENT	1974	1975
ITALY (continued)		
MATERIALS HANDLING EQUIPMENT Location: U.S. Trade Center, Milan		June
IPACK—IMA—INTERNATIONAL EXHIBITION OF PACKAGING, MECHANICAL HANDLING, FOOD PROCESSING INDUSTRIAL MACHINERY. Location: Milan Sponsor: Dr. Ing. Ezio Landini Gen. Sec, Via Ravizza, Milan 20149 Frequency: Biennial		October
JAPAN		
AUTOMATIC AND LABOR SAVING MACHINE EXHIBITION Location: Tokyo Sponsor: Nikkan Kogyo Shinbun 1-8-10, Kudan Kita Chiyoda-Ku, Tokyo	Spring	
INTERNATIONAL MECHANICAL HANDLING EXHIBITION WITH CONFERENCE. Location: Tokyo Sponsor: Japan Industrial Vehicles Association, c/o Toobu Bldg. 1-5-26, Moto Akasaka, Minato-Ku, Tokyo. Frequency: Annual	June	June
PHYSICAL DISTRIBUTION AND MATERIAL HANDLING EXHIBITION WITH SEMINAR. Location: Osaka Sponsor: Nihon Kogyo Shinbun Co., Ltd. 1-7-2, Ohtemachi, Caiyoda-Ku, Tokyo. Frequency: Annual	November	November
INDUSTRIAL ROBOT SHOW WITH HYDRAULICS AND PNEUMATICS EXHIBITION LOW-COST AUTOMATION SHOW, AND ELECTRONICS CONTROL TECHNOLOGY SHOW. Location: Tokyo Sponsor: Nihon Kogyo Shinbun Co., Ltd. 1-72-2, Ohtemachi, Chiyoda-Ku, Tokyo Frequency: Biennial		September
MEXICO		
CHEMICAL AND PETROCHEMICAL PROCESSING EQUIPMENT Location: U.S. Trade Center, Mexico City	March	

EVENT	1974	1975
NETHERLANDS		
MATERIALS HANDLING EXHIBITION Location: Utrecht Sponsor: Koniglich Niedellandische Messe, Jaarbeursplein Utrecht, Netherlands. Frequency: Annual	October	October
EUROPORT—INTERNATIONAL SHIPBUILDING, MARINE ENGINEERING, PORT EQUIPMENT AND COMMUNICATION EXHIBITION. Location: Amsterdam R.A.I. Sponsor: Secretary, N.V. 111 Hoogstraat, Rotterdam, Netherlands Frequency: Annual	November	November
EUROFREIGHT—NEDEX Location: Ahoy' Halls, Rotterdam Sponsor: Europort-Nedex Group, Waalhaven ZZ 44, Rotterdam 3022 Frequency: Biennial		March
PHILIPPINES		
SECOND INTERNATIONAL CONVENTION OF THE PACIFIC ASIAN CONGRESS OF MUNICIPALITIES. Sponsor: Makati Mayor's Office, Pacific Asian Congress of Municipalities	March	
MANILA INTERNATIONAL TRADE FAIR Location: Quezon City Sponsor: Department of Trade, Arcadia Building, Quezon Boulevard Extension, Quezon City, Philippines. In cooperation with Chamber of International Trade, Rm. 914, I&S Bldg. #2, 1515 Roxas Boulevard, Manila, Philippines. Frequency: First Event		November
POLAND		
POZNAN INTERNATIONAL TECHNICAL FAIR Location: Poznan Sponsor: Miedzynarodwe Targi Poznanskie, Ulica Glogowska 14, Poznan Frequency: Annual	June	June
SPAIN		
ELECTRIC INDUSTRY ELEVATION AND MAINTENANCE TECHNICAL FAIR WITH AUTOMATION SECTION. Location: Tercio de Begona, Bilbao Sponsor: Feria de Muestras de Bilbao, Tercio de Begona, Bilbao Frequency: Annual	March	March

EVENT	1974	1975
SPAIN (continued)		
FOIM—BARCELONA INTERNATIONAL GENERAL TRADE FAIR WITH TRANSPORT 74 SECTION FEATURING MATERIALS HANDLING EQUIPMENT AND SYSTEMS (1974) ONLY Location: Parque de Montjuich, Barcelona Sponsor: Feria Oficial e Internacional de Muestras, Parque de Montjuich, Barcelona 4. Frequency: Annual	June	June
INTERNATIONAL CANNING FOOD FAIR Location: Murcia Sponsor: Av Jose Antonio, Murcia Frequency: Annual	October	October
TECHNICAL FAIR ELECTRICAL AND MECHANICAL HANDLING EQUIPMENT. Location: Bilbao Sponsor: Apartado 468 Bilbao, Spain Frequency: Biennial		March
UNITED KINGDOM		
PROCESSING, PACKAGING AND HANDLING OF TOILETRIES, PHARMACEUTICALS AND COSMETICS EXHIBITION Location: Metropole Exhibition Hall, Brighton Sponsor: BPS Exhibitions Ltd., 4 Seaford Court. 220-222 Great Portland St. London W 1 N 5HH.	April	
INTERNATIONAL MECHANICAL HANDLING EXHIBITION Location: Earls Court, London Sponsor: Industrial & Trade Fairs Ltd., Commonwealth House, New Oxford Street, London, WC 1A IPB.	May	
POWTECH 75—THIRD INTERNATIONAL POWDER TECHNOLOGY AND BULK SOLIDS EXHIBITION. Location: Harrogate, Yorkshire		February 18-20
NORTHERN MATERIALS HANDLING AND FACTORY EXHIBITION Location: Manchester		April 14-17
INTERFREIGHT—INTERNATIONAL FREIGHT CONTAINER HANDLING EXHIBITION. Location: Earls Court, London Sponsor: Liffe Exhibitions Ltd., Dorset House, Stamford, London SE 1 Frequency: Biennial		September

EVENT	1974	1975
UNITED KINGDOM (Continued)		
INTERNATIONAL MATERIALS MANAGEMENT EXHIBITION AND CONFERENCE. Location: Metropole Exhibition Hall, Brighton Sponsor: Advisory Company: Modern Materials Management Ltd., Houndmills Road, Basingstoke RG 21, 2XN. Frequency: Biennial		November
U.S.S.R.		
INTERLITMASH—TECHNOLOGY MATERIALS EQUIPMENT EXHIBITION. Location: Moscow Sponsor: Dept. International Foreign Exhibitions 1-A Sokolnitscheski Wal. Moscow U.S.S.R. Wal, 1A. Frequency: Annual	September	September
INTERNATIONAL EXHIBITION OF MODERN MACHINERY AND EQUIPMENT FOR FISH AND SEA PRODUCTS CATCHING AND PROCESSING. Location: Leningrad Sponsor: U.S.S.R. Chamber of Commerce and Industry, Department of International and Foreign Exhibitions, Sokolnichesky Val 1-A, Moscow 107232, U.S.S.R.		July-August
INTERNATIONAL EXHIBITION OF BUILDING AND ROAD MAKING MACHINERY AND EQUIPMENT FOR MECHANIZATION OF CONSTRUCTION AND ERECTION Location: Moscow Sponsor: U.S.S.R. Chamber of Commerce and Industry, Department of International and Foreign Exhibitions, Sokolnichesky Val 1-A, Moscow, 17232 U.S.S.R.		October
VENEZUELA		
AGRO—INDUSTRIAL FAIR MARACAY Location: Maracay Sponsor: Consejo Municipal de Maracal, Estado Aragua Frequency: Annual	March	March
INTRERAMERICAN CONGRESS OF THE CONSTRUCTION INDUSTRY Location: Caracas Sponsor: Camara Venezolana de La Construccion Edificio Centro Professional del Este, Piso 13, Garacas Frequency: Biennial		October

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U.S. DEPARTMENT OF COMMERCE
DOMESTIC AND INTERNATIONAL BUSINESS ADMINISTRATION